FARMING WITHOUT CHEMICALS

The Organic Farmer

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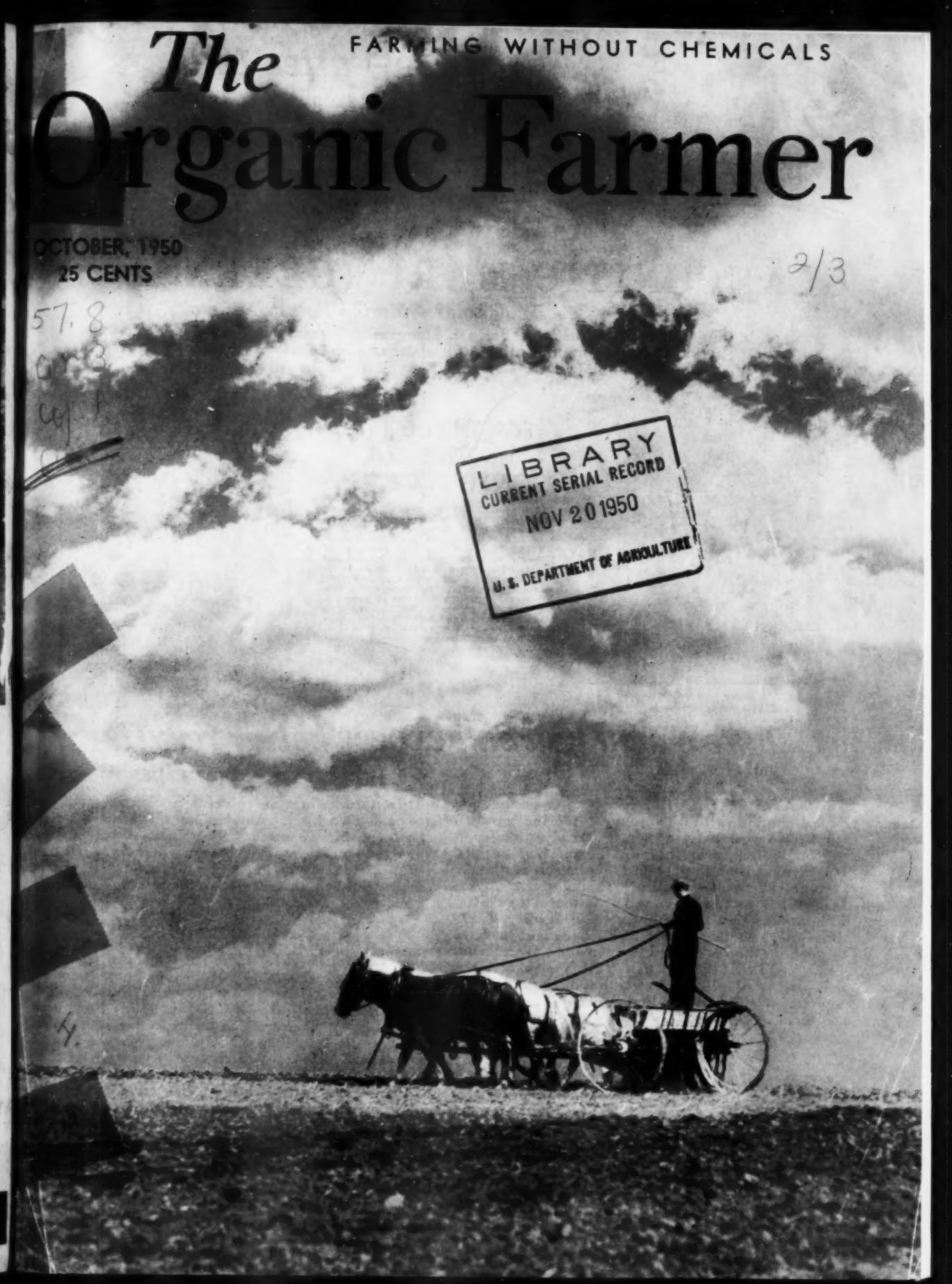

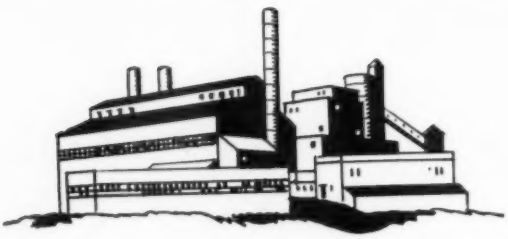

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October, 1950

The Organic Farmer

Farming Without Chemicals

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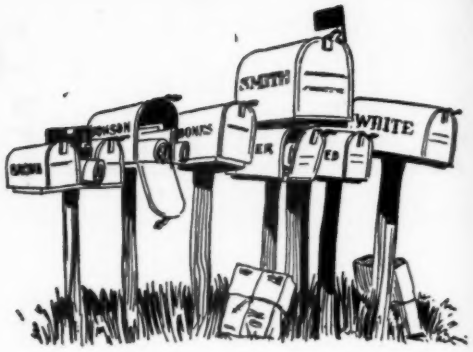
Letters



Report on An Organic Orchard

(Frederick A. Engelmann, who has written this letter, has been experimenting with the organic method in his orchard. Last March we printed his first letter about his orchard. This letter will bring our readers up to date on Mr. Engelmann's orchard.)

Dear Sir:

Since becoming organic minded there is no portion of my orchard that has not been affected in some manner that makes impossible any real comparison between regular commercial practices and the organic system. Within the entire orchard that comprises about 800 apple trees there is one that has been mulched and manured for a period of four years. I sent you a picture of that one tree last season. Unfortunately, that tree has only one apple on it this year. The rest of the 45 organic trees have but a handful of apples on them. There will be enough, however, to have a chemical laboratory test made on them, but for a comparison I shall be obliged to obtain apples of the same variety from another Long Island orchard that is not being handled organically.

The absence of apples on these trees is nothing unusual. The reason that this block of trees was chosen for the experiment was that, although this block consists of mature trees, they have never borne a commercially profitable crop. Consideration was being given to removing these trees when I decided to try organic practices on them to see if they would benefit.

Last year the result was a tremendous crop. If you are acquainted with the habits of apple trees you know that if a tree bears a heavy crop one year it is quite common to have no crop the next season. I had hopes that the organic system might prevent the occurrence of this dormant year and it may still prove so.

I feel that in the orchard the organic system has a tough nut to crack because it is accepted in agricultural circles that the demand for chemicals is heaviest in orcharding. As much faith as I have in organics, I feel that it will be a long time before we can throw away the spray gun. I have doubts that commercially profitable crops of some varieties like McIntosh could ever be produced without spraying. However, on the basis of what I have observed on my organic tree as I call it, the Delicious variety would prove successful.

This year I have eliminated all spraying except dormant delayed sprays on my 46 organic trees, mostly R. I. Greenings and red Delicious, and the foliage is in beautiful condition. I fully believe that those two varieties plus Baldwins, Ganes, Black Ben Davis, Opalescent and Winesaps could produce successful crops with only sprays up to blossom time. We have tried to reduce spraying on some trees that were recently mulched and manured and have sustained serious damage. I have found that spraying must be reduced gradually over a period of about three years.

I shall make a search of the orchard and see if I can find one of the organic trees that has enough apples on it to make it worth while to take a picture. If I can not find one I will take a picture of the tree without any fruit. It will certainly show the healthy aspect of the tree and close-up photos of the leaves will show how free they are from disease and insect damage. Anyone who has tried to take care of even one apple tree knows how they usually look when they are not regularly sprayed.

Frederick A. Engelmann
Commack, N. Y.

Mercuric Chloride and Water Runoff

Dear Sir:

In Miscellany in August you ran an item entitled "Chemical to Stop Water Runoff" in which I believe you draw the wrong conclusion because of insufficient information. In the San Joaquin and Santa Clara valleys of California, organiculture would not help with the "water spreading" operations because the water which is being spread falls as rain as much as 200 miles away and many months before being used. I am more familiar with the operation in the Santa Clara valley because I have visited it and read technical reports about the installations there.

The use of well water for irrigation in the Santa Clara valley caused such a draw down of the water table that, by the middle 1930's many wells around the southern shore of San Francisco Bay were no longer useable because salt water was intruding into the space formerly occupied by the fresh water. Also, the valley floor settled as much as six feet in

the area, but this occurrence was not proved to be associated with over-pumping.

In order to solve the water problem, the Valley Water Conservation Committee made a thorough geological survey of the valley and learned that the water bearing stratum sloped gradually upward from a depth of over 700 feet at the north end of the valley to the surface at the south end nearly 30 miles distant. The water bearing stratum reached the surface at the foothills where the Cayote and Guadalupe Rivers came out of deep canyons and into the valley. (I might say that these rivers would be considered small creeks in the East.)

Since the rainfall in this area of California occurs entirely during the months between October and April, and May through September are absolutely rainless, irrigation is compulsory during the growing season. All the irrigation in the valley was carried on by pumping from wells and so it was decided to attempt to restore the ground water. The first step was to build a dike along the downstream side of the water bearing stratum and to dam the rivers so that all water would be diverted to the diked area and be allowed to seep into the ground.

The rivers are now so completely diked that even in the rainy season no water goes down the stream beds below the dams. After the diversion works were completed, reservoirs were constructed at the headwaters of the river, and this reservoir system is so controlled that water is allowed to flow from them at the rate of percolation of the water into the underground stratum.

The system was completed prior to 1938 because it was in that year that I read the technical reports of the work. When I was stationed in the Santa Clara valley in 1942, many of the wells at the southern end of San Francisco Bay were again useable. In fact, some had become flowing wells. The water conservation engineers made a diligent search for all these flowing wells and plugged them in order to keep the fresh

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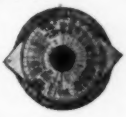

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water in the underground reservoir until it was needed and could be used.

During the summer months of 1942, I noticed a very heavy algae growth in the water in diked ponds over the gravel stratum, and it is probably the prevention of this algae growth that is desired by the engineers when they use mercuric chloride to increase the rate of percolation of water into the underground system.

I found that in the Santa Clara valley, the ranchers all used legume cover crops very extensively in their orchards. In many of them they used a heavy mulch during the dry summer months. The soil in that area of California is a heavy adobe and, without the incorporation of large quantities of organic matter, soon becomes unworkable.

Carl J. Scheve
Trenton, N. J.

Ed. The fact that the water falls as rain 200 miles from the fields has little to do with the fact that it won't seep into the ground when it does get to the fields. I am sure that an increase in the use of mulches would increase the rate of percolation and minimize the importance of the seepage ponds. But couldn't mechanical means to stimulate the flow of water into the soil be used — perhaps a modified type of subsoiling? It might be more expensive, but there would be no chance of poisoning the soil.

Queries and Comment

Starting Out Organically

Dear Sir:

I plan to fertilize 25 acres of ladino clover and orchard grass mixed this spring. Could you give me recommendations as to the amount of rock phosphate and rock potash to apply? Our county has a free soil test service, but they make recommendations in terms of chemical fertilizers.

Would it be logical to apply rock phosphate, rock potash and cottonseed meal broadcast before the plow for burley tobacco? Would enough become available if these materials were applied three to four weeks before transplanting, as we have been doing with the 6-8-6 chemical fertilizer?

How much organic nitrogen in the form of cottonseed meal would give results comparable to a side dressing of ammonium nitrate of 1000 pounds per acre?

Marion Roberts
Paris, Kentucky

Ed. If you apply phosphate and potash rock at the rate of 1000 pounds per acre an application will last from three to five years. Rock phosphate, potash rock and cottonseed meal may be broadcast before plowing for tobacco. Three to four weeks should be sufficient time for these materials to become available.

It would take about 475 pounds of cottonseed meal to equal the nitrogen content of 100 pounds of ammonium nitrate. The cottonseed meal is more expensive, but more of its nitrogen is utilized by the plant.

Weed Seeds in Manure

Dear Sir:

Please tell me how I can kill grass and weed seed in cow manure.

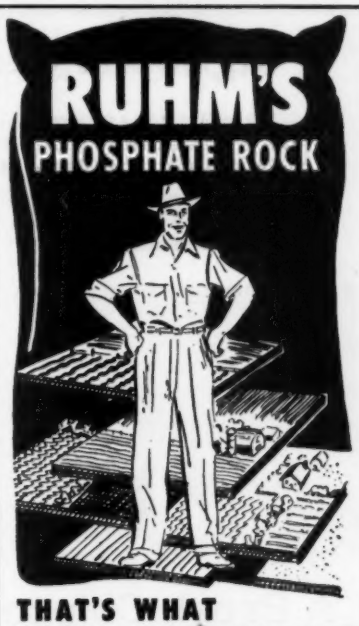
A. V. Mozinga
Lyons, Georgia

Ed. Although composting manure in heaps is wasteful both of plant nutrients and labor, it is the only good way to kill out weed seeds. The heap will soon reach a temperature of 160 to 180 degrees, high enough to kill all seeds.

Fallen Fruit as Fertilizer

Dear Sir:

Please tell me if windfall fruit is suitable for composting or should it



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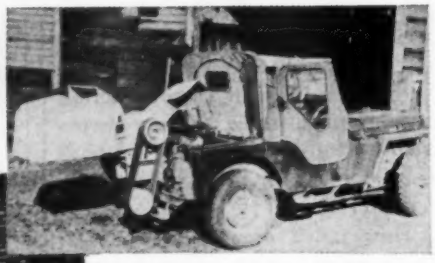

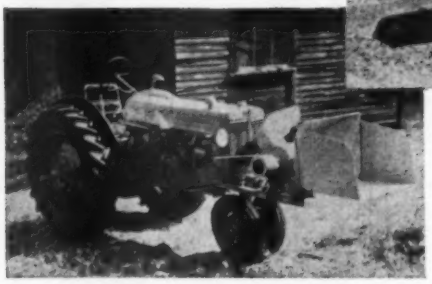

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be disposed of some other way because of the worms in it.

Dr. H. E. Barrows
Monroe, Michigan

Ed. Windfall fruit may be used in the compost pile with no fear of carry over of insects or diseases. Properly made compost will reach a heat sufficient to kill all such organisms.

Potato Scab

Dear Sir:

What causes scab on potatoes and what is the cure?

J. E. Paisley,
Cleveland, Ohio

Scab on potatoes is caused by a fungus, Actinomyces scabies. *Scab thrives best in an alkaline soil low in organic matter. To prevent scab, use plenty of organic matter and keep your soil neutral or slightly acid.*

Cannery Wastes

Dear Sir:

I have a 200 acre asparagus farm, and we have found it to be a real job to get enough fertilizer to spread over the entire acreage. We have used barnyard manure to cover as many acres as possible, putting it on the first or second week in July after we have finished cutting the asparagus for the season.

There is a large canning factory in the vicinity of my asparagus farm which has a large pile of ensilage which consists of sweet corncobs, husks and trimmings. Do you think that this organic matter could be utilized in some way?

The compost heap which is suggested in Mr. Rodale's book seems quite feasible for a small acreage, but for as large an acreage as I have it seems almost impossible.

E. H. Gunter,
Guttenberg, Iowa

The best way to use the organic matter that you have available would be to spread it as a mulch either on a fallowed portion of your farm or around the growing plants. We have grown asparagus using a mulch

on the organic experimental farm and it is really beautiful. If you want to, though, you can compost the corn wastes using a manure loader or other machinery to mechanize the process. Then you would be able to handle large amounts economically. However, when you compost in heaps you lose a great deal of nutrient value. The heaps heat up considerably, and much valuable stuff literally burns up.

Vetch Seed

Dear Sir:

I am in need of a small amount of vetch seed to plant a strip 30 by 60 feet and I have been unable to find any in this locality. Where can I get this seed?

Elizabeth Babitt,
Columbia, N. J.

The best thing to do when you can't find a particular kind of seed that you need is to write to the Department of Agriculture in Washington. They will tell you just where you can buy any seed if it is available to the public.

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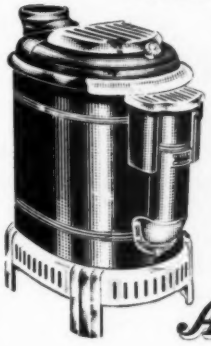

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FOR THE LIFE OF YOUR SOIL, FARM THE ORGANIC WAY

With the Editor

Older Researches on Chemical Fertilizers.

By J. I. RODALE

I HAVE come across a booklet issued in 1914 by the New Hampshire Agricultural Experiment Station entitled *The Effects of Fertilizers on a Cutivated Orchard* which reflects an old-time attitude on the subject of fertilizers. That booklet evidently was issued before the days when so much money is being given to the agricultural stations. It was published at a time when stations had not adopted "policies" in favor of commercial fertilizers and when agronomic minds were more independent and free than they now are. It is refreshing, therefore, to enjoy its honest unbiased pages. I would like to share this pleasure with the readers of this magazine.

In the introductory portion of the bulletin appears this statement: "Up to the present time we have not received any cash return for the fertilizer that has been used in this orchard." Another sentence reads: "There can be little doubt that much fertilizer has been used in the orchard and on the farm that has been of no value to the land or crops. . . . The fact that fruit trees have not responded to artificial fertilizers in the same way that has been reported for farm crops has been a constant source of trouble for it is quite natural to reason by analogy. It is doubtless a truism to say that the recommendations to "feed the trees" have been largely based on information given us by the chemists." The reference to chemists is interesting. Is it possible that there were no chemists in experiment stations in 1914, but just plain agriculturists?

The report goes on to say: "The chemical analysis of the tree and its product is made and then the analysis of the soil on which the tree grows is made. From this data is calculated the amount of plant food which should be returned artificially to maintain the fertility of the land. Obviously, the trouble with such a theory is that it does not take into consideration the mechanical and physical condition of the soil or the important role of microorganisms to soil fertility and the associated factors — heat, moisture and soil sanitation."

That statement shows again that common sense is ruling in the station and that the people there are concerned over the biologic health of the soil. Today one can safely say that in few experiment stations are any minds disturbed over the evil that is being brought to the soil and its microorganisms by giving them baths of chemical fertilizers and poisonous insecticides. Usually, artificial chemicals operate to make a soil practically sterile from a biologic point of view. I have been on chemically fertilized and sprayed potato farms where I have not been able to find a single earthworm. Can the agronomists of today feel clear of conscience about such a condition and the effect on the nutritional quality of the food produced on such a soil?

Here is another statement from the New Hampshire bulletin: "Some experimental work conducted in England at the Woburn Experimental Fruit Farm, and reported in the fourth and fifth reports of that station, shows no effect from the annual application of manures or commercial fertilizers to an orchard under cultivation for a period of fourteen years. The fact that returns from the application of fertilizers in a cultivated orchard were not superior to returns from good cultivation is significant in this connection. . . . Neither moderate nor heavy dressing of dung or artificial fertilizers, nor of both combined, had any appreciable effect on any feature of the trees nor on the crops from them."

Then reference is made to an experiment in Massachusetts (Manuring an Apple Orchard. 22nd Annual Report, Mass. Agri. Exper. Sta., Part 11, 1910.) in which barnyard manure as the fertilizer in an apple

orchard outyielded chemical fertilizers. The figures showed that the total yield for a period of 15 years was as follows:

Barnyard manure	24,934 lbs.
Bone meal and muriate of potash	14,453 lbs.
Bone meal and low grade of sulphate of potash	21,863 lbs.

Let me quote further from this report:

"Professor U. P. Hedrick in commenting on this experiment (in which 100 pounds of wood ashes and 8½ pounds of superphosphate were applied per tree) says: 'The returns obtained in this twelve-year experiment are negative from a practical standpoint. The experiment shows that it is not profitable to apply potash, phosphoric acid or lime to the soil of the station orchard. Fifty-seven years of orchard cropping have not reduced the soil to the condition where it needs a "complete" fertilizer, yet the leguminous cover crops plowed under in the orchard have usually produced beneficial results the same or the next season.' Elsewhere he makes this significant statement: 'An interesting fact is that both treated and untreated plots increased markedly in yield from 1893 to 1904. The probable explanation is that prior to 1893 the orchard was in sod, but during the experiment was kept under cultivation and grew more productive under the treatment.'

"Here we have a notable case of an orchard under cultivation not responding materially to the application of potash, phosphoric acid and lime, but all plots improving markedly when a good system of culture was followed."

The next item in this report refers to an experiment at the New York Experiment Station and Prof. U. P. Hedrick in commenting on it said: "The trees in this experiment would have been practically as well off had not an ounce of fertilizer been applied to them." He then draws attention to the fact that it may be necessary to fertilize some orchards in the state, especially those on light soils, but my own comment is that in such cases the use of organic matter and ground rock would be safer than chemical fertilizers from the point of view of the ultimate health of the trees.

In referring to experiments conducted at the Pennsylvania Agricultural Experiment Station (Bulletin 121, 1913) the bulletin summarizes as follows:

"These experiments show beneficial effects from fertilizers both on trees in sod and under cultivation. Manure is giving the best results in cultivated orchards. This is the first one of the experiments noted where a decidedly beneficial effect has been secured by fertilizing an orchard which is receiving a good system of orchard culture including a leguminous cover crop. We wish to call special attention to this fact in view of the recommendations given in this bulletin, namely, it may or may not pay to fertilize a well tilled orchard."

The main portion of this New Hampshire bulletin is taken up with a six year experiment in an apple orchard which is summarized as follows:

Conclusions

A five-year average of the results from this orchard do not show an increase in the yield of the fertilized plots over those receiving good culture, or a sufficient increase in the growth of the trees to warrant the use of fertilizers. We have applied approximately $250 worth of fertilizers in this orchard, not including the cost of hauling it four miles and its application. It is on such light soil as is found in the Woodman Orchard that one would expect trees to respond to fertilizers if they would anywhere, but such has not been the case. Such a light soil favors maturity and there is not the difference in color of fruit between sod and cultivation that might be expected; it varies some with the season, however. What the future may reveal in this experiment cannot be told.

Since this bulletin was published 36 years ago, hundreds of experiments with orchards have proved that clean cultivation is definitely not a wise practice. It produces good results for a while, but leaves the land open to erosion and allows little chance for the replacement of organic matter. I advise an orchardist reading this to use or maintain sod or a mulch in his orchard.

My main purpose in presenting this document is to show that forty years ago the agricultural stations were more inclined to make comparisons between animal manures and chemical fertilizers. Today, they compare one chemical fertilizer with another.

Is there a reason? Possibly. In those early days the fertilizer industry was small and unorganized. It had little money available for grants to research institutions. Therefore, the experiment stations were less restricted in their activities than they are now.

If a graph could be constructed comparing the number of research grants by the fertilizer industry with the study of organic matter and manure it would show, I am sure, that as the subsidization increased, the experimentation with manure gradually decreased.

I know of a study which was recently made of the writings and researches in medical journals in regard to the dangers to the human body of drinking coffee. The investigating worker noted that between 1900 and 1915 there were a great number of studies made on this subject. Between 1915 and 1925 the amount of such medical researches declined. From 1925 to 1935 it went down much more and from 1935 to the present there was practically no work done with coffee.

Why should that be? Is it because the coffee industry became more wealthy and better organized? Is it because the medical research organizations became afraid of the increasing power of the coffee industry? Is this lack of research caused by the typical fear that duly constituted

(*Continued on page* 59)

More Profit Without Chemicals

Norman Oldt finds that organic farming pays, and he tells that to his neighbors.

By ALDEN STAHR

"YOU can learn a lot about farming just by watching the animals," said Norman Oldt as we looked over his herd of 44 Holsteins and Guernseys. "Now look at that pasture the cows are in. Looks terrible, doesn't it? But they'll stay in there and eat it down to the ground and leave the alfalfa alone in the next field even with the gate open."

"How do you explain that?" I asked.

"Phosphate rock," he said. "Both fields got limestone, but this scrubby blue-grass pasture got phosphate rock, too. Now you can't get the cows out of it."

"Any trouble with disease?"

"Used to have some trouble with the cows not cleaning right after calving," he replied. "But that's cleared up since I put the phosphate rock on the fields. Now I'm hauling greensand from Jersey and spreading it. The animals will tell you what they like and it's the minerals they want."

Oldt showed me two horses as hefty as any I've seen and explained that they got only that remineralized pasture and not a grain of oats.

Oldt's 175 acres are in the rolling hills of mid-Pennsylvania, at Stine's Corner in the heart of the Pennsylvania Dutch country where prosperous-looking farms are the rule and accents are as thick as cream. Of course, they are not Dutch but Deutsch, which means German, and a little jabbering in this tongue did much to penetrate the reserve characteristic of these people. Even in this area of fine farms, Oldt's place stood out. His pastures were greener and his corn taller and darker than any I had seen. Just for fun we measured the corn and it stood ten feet high. In fact, the children got lost in it and had to be rescued.

Oldt's appraisal of his own corn was "It ain't been hurt none," but it was a happy sight compared to the shriveled, chemical-raised corn across the road. There had been a dry spell and this is when the damage of commercial fertilizers really shows up.

With such a heavy stand, Oldt needs to raise only fifteen acres of corn and here he points the way to

Looks like Iowa, doesn't it? It's Pennsylvania corn, but grown organically.

less work through heavier yields on less acreage. On his corn field, as on other crops, he uses phosphate rock, limestone and barnyard manure and he is currently adding greensand as a source of potash and many trace elements.

Oldt's farm is the kind you dream about — stout barn, neat home and a spic and span house for the hired man and his family, sleek cows and tall corn, and a pink-stone milk-house finer than the homes of half the nation. Twenty years ago, when Norman Oldt started with the farm, friends told him it was worn out, would raise nothing, but he has rebuilt the soil to its present state of high productivity by natural organic methods and he says himself that he never had it so good since he banned commercial fertilizers from his farm and embarked on a program of common sense fertility building.

Anyone knowing the Pennsylvania Dutch farmers, is aware that they are level-headed businessmen, and if organic farming were an uneconomic fad it would have little chance of being practiced by a top-grade farmer like Norman Oldt. He's in farming to make a good living and he's doing just that — with organic farming.

Norman Oldt watches his cows graze on an organic pasture — fertilized with ground rock.

Like all good organic farmers, Oldt is spreading the influence of his methods in his own vicinity. As we drove around in his brand-new car, he pointed out a field heavy with tomatoes on a neighbor's farm. "Just organic stuff and phosphate rock," he said. "We use lots of it around here."

We should like to have spent more time with Norman Oldt and his friendly family, but our children were getting cranky, the hour was late and we had another hundred miles to go. But as always in visiting organic farmers, we hated to leave, but when we did, we had that warm glow that comes of a friendly farm visit and the knowledge that here we had seen farming at its best.

The Spray Residue Problem

Enforcers of the food and drug law are strongly opposed in their fight to keep poison tolerances low.

By FRED B. LINTON

From the Food, Drug and Cosmetic Law Journal

HOW much lead and arsenic in the form of spray residue on fruits and vegetables can be eaten without danger to health? That question was acute in 1927, when the Food and Drug Administration was organized. Since then, more effective insecticides have come into use. The problem of tolerances for the newer insecticides is still with us. The history of the struggle to keep lead arsenate within safe limits is illuminating.

Loss of Foreign Market Threatened

Health hazards from excessive spray residues on apples received attention as early as 1919. In that year the Boston Health Department found apples on the market that contained quantities of lead arsenate which were considered by that department to be dangerous to health. Later, the British Ministry of Health threatened to outlaw American apples because of excessive residues.

Surveys were made by the United States Department of Agriculture to determine how much arsenic and lead remained on apples at the time of harvesting. The amounts varied greatly. Methods for washing apples in a dilute acid solution that would remove most of the residues were developed by the specialists of the United States Department of Agriculture and state experiment stations, which were used extensively by the apple industry. More accurate methods of chemical analysis to determine the exact amount of lead remaining on apples were developed in the Food and Drug Administration by Dr. Ward B. White.

Hundreds of shipments of apples bearing excessive residues of lead and arsenic were seized under the pure food law and removed from the market until cleaned and made safe for consumption. Extensive educational work to show apple growers both how to spray and how to wash apples, so they would be free of excessive residues when ready for the market, was carried on by Federal and state horticulturists. The amounts of spray residue permitted were reduced from year to year until, in 1932, the so-called world tolerance of 0.01 grains of arsenic per pound of fruit was reached. At that time, the apples produced in American orchards, with very few exceptions, reached the highest peak of perfection in wholesomeness. Not even the most carping critic could complain of any health hazard from the consumption of apples as the cleaning and control campaign reached a climax.

Shippers Oppose Low Tolerance

Up to that time, most apple growers and shippers supported Commissioner Campell's program. A few did so reluctantly. A still smaller group fought it from the first, and contested in court the seizures and prosecutions instituted. In almost every court case the charges of the government were upheld.

During the economic depression of the early 'thirties, the price of apples dropped sharply. As the margin of profit narrowed, in some instances to the vanishing point, the cost of washing apples in a dilute acid solution became more and more burdensome to apple growers. Protests against washing increased rapidly in number and in intensity. Eventually they descended like an avalanche, not only upon Campbell but upon members of Congress, cabinet officers, and the President.

For eight years, Campbell withstood the pressure although it required all his powers of persuasion. He was supported by a sincere conviction, shared by horticulturists, pharmacologists, chemists, health officers, and a few leaders of vision in the apple industry, that holding spray residues on apples at the lowest level practical of attainment is desirable both for the protection of the public health and in the long run for the best interests of the apple growing industry. It had been demonstrated for eight years that a very low level of spray residue on apples could be attained by the use of proper methods of spraying and of cleaning. Campbell made a gal-

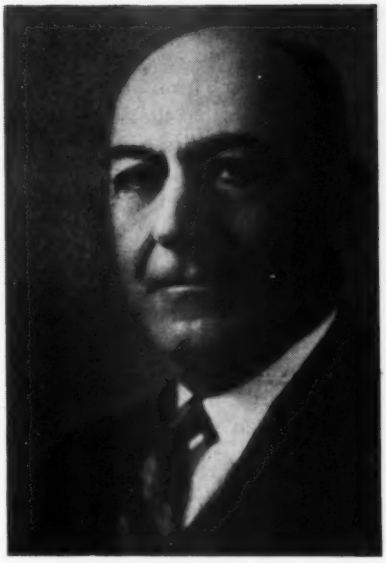
lant fight to hold the low levels attained in 1932 and retained up to 1940.

One apple grower was an influential member of the Committee on Appropriations of the House of Representatives, who later became chairman of that powerful committee, the committee to which Campbell must appeal for funds to support the enforcement of the Pure Food Law. The Honorable Clarence Cannon owned and operated an orchard in Missouri. He considered the spray residue program to be nonsense. He undoubtedly was sincere in his oft-expressed opinion that lead arsenate on apples never harmed a man, woman, or child.

Campbell Challenged by Cannon

A subcommittee of the Appropriation Committee of the House, early in the year 1935, held hearings on the appropriation bill for the Department of Agriculture, which then included the Food and Drug Administration. The Honorable Mr. Cannon, at that hearing, paid his respects in no uncertain terms to the program which had reduced each season the tolerance for arsenical spray residues until it reached the low level of the so-called world tolerance, and within the limits deemed safe by eminent pharmacologists, toxicologists, and medical specialists.

Mr. Cannon, as a member of the subcommittee, asked various bureau chiefs of the Department of Agriculture as they appeared before him if they had personal knowledge of anyone having been made ill by eating apples sprayed with lead arsenate. They answered that the effect on the health of consumers of arsenic and lead on apples was not within the field of their official investigations, but was the responsibility of those who administered the pure food law. They suggested that Mr. Cannon ask that question of Mr. Campbell. Mr. Cannon repeatedly challenged the Department to produce any evidence that any person had ever been harmed by eating apples sprayed with lead arsenate.



WALTER G. CAMPBELL
Food and Drug Commissioner
(1907-1944)

Cannon was presiding as Acting Chairman of the subcommittee when Mr. Campbell appeared on February 11, 1935, to support his estimates for funds for the next fiscal year. Mr. Cannon and other members of the subcommittee, as was their duty, closely cross-examined Campbell on the law enforcement operations of the Food and Drug Administration. Toward the end of the hearing, Cannon remarked that he had no doubt but that Campbell had been told of the questions asked about spray residue and that he had come prepared to answer them.

Committee Hears Evidence

"As a matter of fact I am prepared to submit evidence on the subject," replied Campbell. For an hour he held the intense interest of the members of the subcommittee as he reviewed, with scarcely a glance at his notes, an array of facts assembled by specialists of his scientific staff on the ill effects of both lead and arsenic. He reviewed the scientific literature on the subject covering the work of many investigators both in this country and abroad. There was abundant evidence to show that when lead or arsenic are consumed in relatively minute quantities over a long period of time adverse symptoms develop. There had been no scientifically controlled experiments yet completed which proved conclusively how much of either could be consumed with safety by healthy people, much less by invalids and children. The minute quantities permitted under the Food and Drug Act were the amounts recommended to him as safe by a committee of the leading toxicologists of the nation.

In accepting Cannon's challenge to cite any specific instances of injuries caused by eating apples bearing lead arsenate, Campbell told of the case of the daughter of a physician residing in Billings, Montana, who became seriously ill. Her physician-father diagnosed her ailment as arsenical poisoning from sprayed apples which she had eaten in considerable quantity. He sent her to the Mayo Clinic where the diagnosis of arsenical poisoning was confirmed. She was returned to her father's home where in a short time she died. Of this case Mr. Campbell on another occasion said, "There is no doubt in her father's mind or in the minds of the physicians of the Mayo Clinic about the cause of her illness, and the doctor on the basis of his own investigation unhesitatingly concluded that death was due to the consumption of fruit sprayed with arsenical sprays."

Campbell also cited the illness and death of a boy reported by a physician of Charles Town, West Virginia. When the physician was called to treat the boy, he learned that the lad had played, on the previous day, in a nearby orchard. He had eaten ten or twelve of the sprayed apples which had not yet been harvested. After his death, an autopsy revealed characteristics of arsenical poisoning. Specialists in Baltimore, who made laboratory examinations of organs from the body of the boy, found quantities of arsenic and of lead "sufficient to justify the conclusion by them that death was due to metallic poisoning from eating fruit."

Although other specific poisoning cases were cited by Campbell, he as-

serted that the chief dangers from spray residues on apples were not acute illnesses resulting in sudden death. Admittedly there were only a few such cases on record. The damage is usually chronic. The continued consumption of lead arsenate has cumulative effects which include deterioration of the liver, kidneys, and other organs of the body.

Evidence of Poison Deleted

When the official printed record of the hearings consisting of 1,693 pages for the Department of Agriculture as a whole reached my desk a few days later, I turned at once to that part relating to the Food and Drug Administration. I was eager to see if Campbell's words were as convincing in print as when spoken to the committee. To my amazement the printed record contained nothing of his statement about spray residue! Not a single word of his evidence on the danger of lead arsenate on apples had been printed. Someone had deleted every word he said on the subject.

Even more amazing was the fact that Cannon's challenges to other bureau chiefs to show a single instance of the harmful effects of spray residue were printed. Also printed were the replies of the other bureau chiefs who stated that Campbell was the man to whom Cannon's questions should be directed. All fingers pointed to Campbell, but when one turned to his testimony as printed, it appeared he had failed to accept Cannon's challenge, the implication being that he was unable to furnish any evidence in support of the spray residue program.

Senator Copeland of New York noticed the omission, or was it called to his attention? He telephoned Campbell and inquired why he had not discussed, in response to Cannon's challenge, the hazards from spray residues of which the Senator, as a physician, was aware. Campbell replied that he had discussed the subject at length but that every word had been cut from the official record. He also told the Senator that the official reporters had typed his statement in full but that all of it had been deleted before the report was printed.

Senator Copeland demanded of the official reporters a copy of all that Campbell had said at the committee hearing. The copy was furnished. A few days later, Senator Copeland arose in the Senate Chamber and called the attention of his fellow senators to an error in an official report. The error was made, he asserted, by the usually careful and accurate printer. On the innocent printer the senator with grim irony placed the responsibility, although every senator present knew that such deletions were never made by the printer unless authorized or directed by some responsible official of the Congress. Waving the typed copy of Campbell's statement, the senator threatened to read it in full at a later date for the edification of the Senate and of the public, and thus have it published in the *Congressional Record*. There it would have wider publicity than in the report of the hearings. Repercussions from the senator's speech were immediate.

Buchannan Seeks the Facts

James P. Buchannan, of Texas, was at that time Chairman of the House Committee on Appropriations. One of the fairest men that ever represented a district in Congress, Chairman Buchannan did not ignore the implications of the ironical speech of Senator Copeland. He at once summoned Campbell to his office at the Capitol. At Campbell's request, I accompanied him.

Chairman Buchannan said he was greatly concerned to learn that questions had been raised as to the correctness or completeness of the official record of a hearing before a subcommittee of the Committee on Appropriations. What did Campbell know about it? I have known few men who can select the significant facts of a situation and state them more clearly than can Mr. Campbell. I never heard him speak more effectively than on this occasion. Most vividly he pictured the complex spray residue problem, the efforts of himself and others to solve it to the advantage of both those who grow apples and those who eat them, and his surprise and indignation at the deletion from the official record of his entire testimony on the subject.

Buchannan listened intently to Campbell's story, and then said, "Mr. Campbell, it is too late to change the record already printed. I assure you, however, that any statement you make hereafter on spray residue or on any other subject before the Committee on Appropriations or any subcommittee of it, will be printed in the official record, as long as I am Chairman of the committee." He added with a twinkle in his eye, "I advise you not to say anything before the committee unless you want it printed."

On February 22, 1937, Chairman Buchannan died.

Poison Investigation Stopped

In the meantime, Mr. Cannon had been made Chairman of the subcommittee which handled the appropriation bill for the Food and Drug Administration. In the appropriation act for the fiscal year beginning July 1, 1937, there was inserted this provision: "Provided further, That no part of the funds appropriated by this act shall be used for laboratory investigations to determine the possible harmful effects on human beings of spray insecticides on fruits and vegetables."

That provision stopped a scientific investigation that had been under way for two years in the Pharmacological Division of the Food and Drug Administration to find out exactly how much lead and arsenic could be consumed without harm to health. A staff of pharmacologists and toxicologists well-fitted by training and experience to conduct a scientifically controlled experiment,

had been selected and put on the project two years before by Commissioner Campbell after consultation with, and upon the advice of, leading specialists throughout the nation. The plan of the investigation had been considered, modified, and approved by a committee of eminent scientists appointed by the National Academy of Sciences.

Dr. Herbert O. Calvery, who had immediate charge of investigation, was an eminent pharmacologist and commanded the respect and confidence of other scientists carrying on research in the field of toxicology. Within another year the scientifically controlled experiments would have answered authoritatively the question of how much lead and arsenic could be consumed without harm to health.

That provision in the appropriation act stopped not only the investigation of the Food and Drug Administration, but laboratory experiments in other bureaus of the Department of Agriculture, which were charged with the responsibility of finding new insecticides and recommending their use after finding out if they were safe for use.

Poison Tolerance Increased

Congress, in another appropriation act, authorized an expenditure of $50,000 annually by the Public Health Service "for investigations to determine the possibly harmful effects on human beings of spray insecticides on fruits and vegetables."

The Public Health Service, not on the basis of scientifically controlled experiments, but on the basis of a three year survey in apple-producing sections, recommended that increased quantities of lead and arsenic be permitted. The change was announced in the 1941 annual report of the Food and Drug Administration as follows:

> Liberalized tolerances for lead and arsenic residues on apples and pears were announced by the Federal Security Administrator on August 10, 1940, upon the recommendation of the United States Public Health Service after its three year investigation undertaken at the direction of Congress. The tolerance for lead was placed at 0.05 grains per pound of fruit, and for arsenic (arsenic trioxide) at 0.025 grains per pound. The investigation of the Public Health Service dealt only with lead and arsenic in the form of lead arsenate on apples and pears, and it did not deem the revised tolerances applicable to other food commodities.

"Liberalized" may be, or may not be, the appropriate word to apply to a change that permitted twice the amount of lead and two and one half times the amount of arsenic previously permitted on apples and pears. Safe levels for such potent poisons as lead and arsenic should be determined, say competent pharmacologists, on the basis of data acquired by laboratory tests of their effects on guinea pigs and other animals under scientifically controlled conditions in conjunction with data already acquired through observation of their effects on human beings.

Farmer's In Better Position Mechanically

Fort Collins, Aug. 25 — Farmer's will go into the newest international "pinch" much better equipped mechanically but are probably due for a gradually increasing manpower shortage, says S. Avery Bice, economist with the Colorado A & M Extension Service.

The manpower situation was getting tight even before the Korean war, he says, and this tendency will gradually gain momentum. Industrial wages are headed upward and more attractive to those who have been employed on farms unless tight wage controls are put into effect.

Farm employment dropped by about a million men between 1940 and 1945 and since has remained about steady. What has happened to all the farm hands? "They've been replaced mainly by increased mechanization," Bice says.

The manpower shortage, high labor rates and lower quality workers will be noticed especially by farm enterprises which still rely mostly on man rather than machine power.

Lack of available farm machinery during World War II brought about considerable restocking and new machinery designs following the conflict when factories re-opened. Thus, many farmers have comparatively new equipment which should last for several years, Bice said.

Use Pasture for Beef, Let Grain-Feeders Stew

If your purpose is to produce pounds of beef from grass, put your cattle on good pasture and let your "dyed-in-the-wool, feed-'em-grain neighbors" stew.

Some folks can't stand to see cattle eating grass, but insist they should be eating grain to get fat, says Harry Russell, Illinois College of Agriculture livestock extention specialist.

But he points out that University experiments show cattle can gain 1.5 pounds per head per day on good pasture. A gain of two pounds a day is not unheard of in a good season. Tests show that pastures can produce 300 pounds of beef an acre in a full pasture season. Even more than 400-pound gains are possible.

Russell suggests this pasture program for beef production in Illinois:

1. Buy cattle in the fall.
2. Winter them on roughage.
3. Put them on pasture for 90-100 days for the following summer.
4. Feed on pasture or in drylot about 100 days. Grain feeding at the end of the pasture program usually increases the value of the grass gain.

Russell says steer calves and light yearlings work about equally well in this program. It fits best where there are enough good legume and grass pastures to provide at least an acre per head.

Trees and Agriculture

Beautiful and majestic–the tree is also the farmer's friend.

By JACK VAN CLUTE

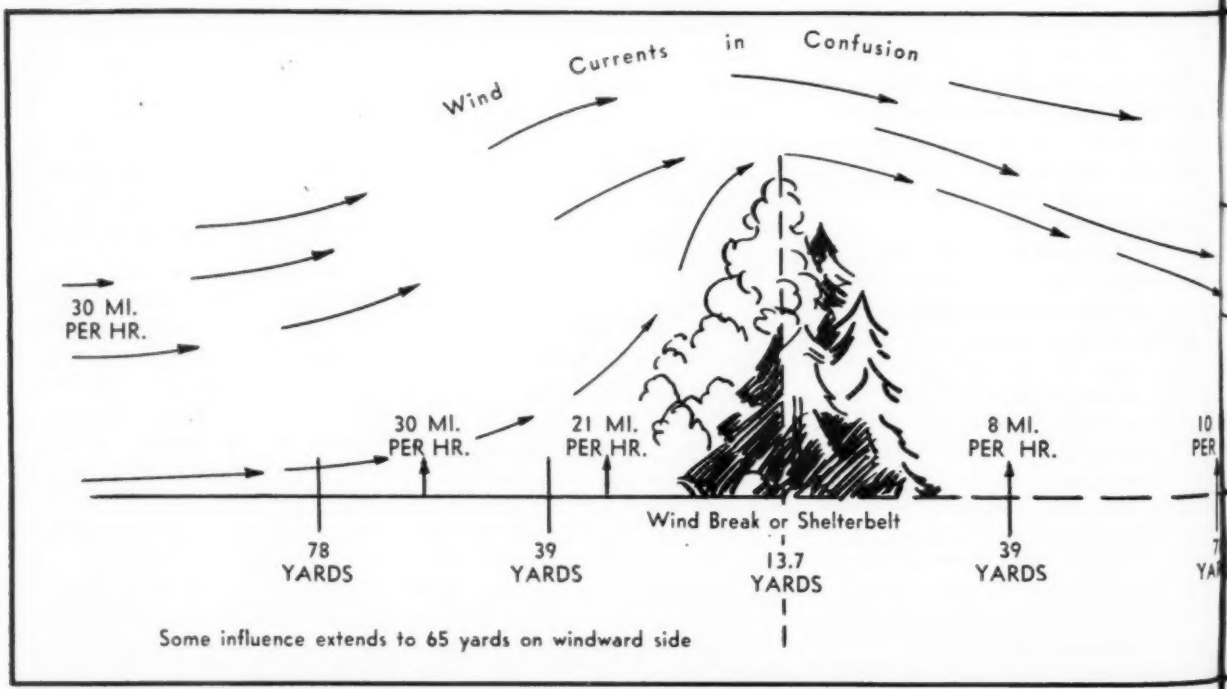
From THE ORGANIC FARMER, October, 1950

LONG have we regarded the park elm or the roadside oak for their historical or aesthetic value. And longer still have we regarded all trees for their utility.

But now with the rising trend of organiculture we know that trees were the first composters, and that since the first leaf drop they have been adding humus to the soil. Moreover, with organiculture we are beginning to appreciate other ways in which trees are linked with successful agriculture. For example the moderating effect of forests on extreme temperatures, and the economy of windbreaks in erosion control and livestock care.

That trees moderate temperature was shown in a survey made in India, according to Dr. Raphael Zon, retired director of Lake States Forest Experiment Station. In the almost treeless area of the Ganges the absolute temperature from April through July was a little over 114 degrees, whereas for the same period in the forested areas of the Assam the thermometer registered a high of 95, or nine degrees cooler than in the treeless region.

More startling are the results of a survey along the Amazon River, the largest forested area in the world. The middle and upper extensions of the river are over 600 miles from the Atlantic Ocean, and are separated from the Pacific by the high Andes. Moreover, the basin is near the equator, which might lead one to expect high temperature and dryness. Yet, the average temperature of the warmest month along the Amazon is not greater than that at the ocean — "and even not as high as temperature often expressed in the middle latitudes," says Dr. Zon. This heat moderation



comes from the cooling effects of dense forests, due to the evaporation from the soil and tropic plants. And in the Amazon Basin, as in densely forested areas of all tropical countries, the rainfall is heavy, seldom less than 60 inches a year.

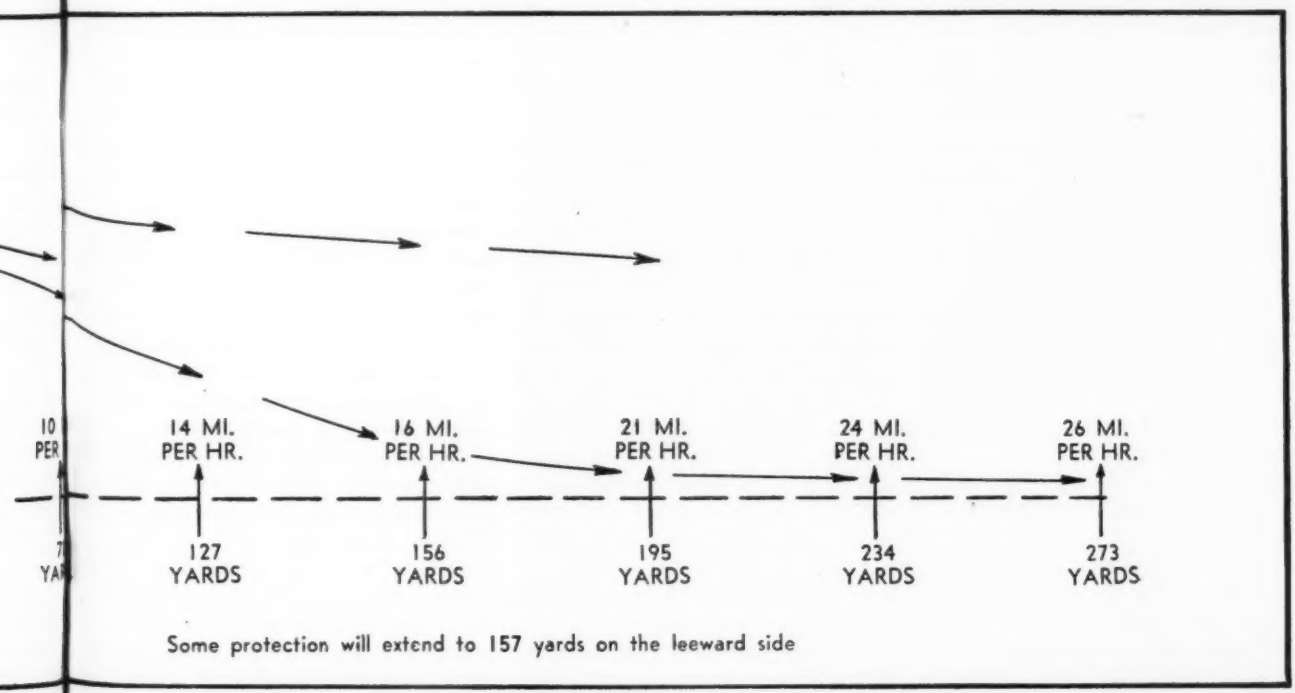
The Amazon Basin also is a good example of moisture conservation by means of organic matter. "So thick usually is the mass of decay and leaf litter and fallen and half rotted trees that most of the rainfall is absorbed and only a small portion runs from the surface," says Zon. "The evaporation differs from water surface evaporation in that, while forests during the day are continually using up heat by converting it into latent heat through transpiration, bodies of water are directly heated by the sun's rays, becoming as it were, temperature reservoirs. . . .The total area of the leaves is so great that at night they cool off quickly. When they have reached the dew point temperature, vapor of the air condenses on their surface. Thus a part of the water which has been transpired during the day is brought back to be transpired again the next day. Therefore the forests may be likened to a self-feeding boiler, the water from which is evaporated into the air."

Forest influence on temperature is more stable in the soil than air, because intermingling bodies of air tend to equalize their temperatures. Scientists find that forest soil is warmer in winter by 1.8 degrees, and cooler in summer by from 5.4 to 9 degrees than soil without forest cover. This is true to a soil depth of four feet! Thus, in a way trees act as thermostatic control both above and below ground, a fact which stresses the advantages of mulching during a hard winter or hot summer.

However, the pioneer farmer on the western plains had neither mulches nor soil temperature in mind when he set out windbreaks. He was a rugged individualist who learned the hard way. Instead of settling in a village, the custom in Europe, he staked out alone, often miles from his nearest neighbor. When he left the Illinois prairie, the springboard of westward migration, he hit a dry, treeless region. High winds swept his homestead, oftentimes with violence, making him tree conscious. First, he planted trees around his house, then the barn and finally along the windward side of his fields. Gradually was born the shelterbelt plan which is finding wise use today.

Shelterbelt experts have come forth with some facts pertinent to farm economy. It is estimated that a 30-mile-an-hour wind striking a shelterbelt is broken up and thrown into such confusion that it does not regain its initial velocity until reaching a point over 40 rods beyond the belt. That not only prevents wind erosion, but works to the better care of livestock. A survey made in Iowa discloses that stock feeders are convinced that a windbreak enables them to save from $5 to $10 on the cost of feeding every steer, — a gain of from $1000 to $2000 per carload!

The early-day farmer east of the Mississippi was inclined to cut down every stray tree along his fence rows because "it shaded the corn." Quite true. The corn near the tree made a smaller growth, so down came the tree, and next year the outside row of corn grew uniformly tall. But the farmer didn't realize what scientists have found — that soil and growth farther out in the field were better when the tree stood. And even one large tree is a factor in confusing air currents and tempering erosion.



Some protection will extend to 157 yards on the leeward side

Trees and Agriculture

Continued

The Government helped the pioneer by encouraging forestation. In 1873 Congress passed the Timber Act whereby any settler who planted 40 acres of trees became the owner of 160 acres. But lack of experience and ineffective administrative control prevented enforcement of requirements in many cases. Still, as a result of the Timber Act, the prairies today are dotted with shelterbelts around individual farmlands.

Western states readily encouraged early tree plantings. Kansas, the geographic center of the country, derives its name from the Sioux Indian word, "Kanza," meaning "swift wind." The state has neither mountains nor marshes, consequently it was practically treeless and ruled by the wind's will in an early day. Admitted to the Union in 1861, two years later Kansas became the first state to pass a tree bounty law encouraging plantings.

The Timber Act was repealed in 1891, but thirteen years later the Kincaid Act favoring trees was passed. Added interest was given four years later with the inclusion of demonstrational tree planting in the program of Northern Great Plains Field Station near Mandan, North Dakota. History shows that without government help, windbreak establishment has never kept pace with man's need. Instead of planning tomorrow's farm, he seems to go by the motto "sufficient unto this day is the need thereof."

Livestock herds were grazing over square miles of level grasslands when World War I broke out. With the war came the urge to produce more food. Farmers began plowing grazing land which, as we were to learn bitterly, never should have been broken up. Herds of cattle and sheep were driven to other ranges, regions of poor soil. This led to overgrazing and destruction of protective grass cover, thus setting the stage for a big scale national calamity.

In the early 1930's severe droughts prevailed. Large areas, stripped of vegetative cover and exposed to drying action of sun and wind, became a dust bowl. Whole sections of the Great Plains boiled up and headed for points east, completely exhausting the top layer of farm soil. Thousands of farms were ruined, while eastern United States was blanketed with dust. With that top layer of soil went the hope of many a farmer for immediate survival in his locality. His livelihood so suddenly windborne, he piled a few trappings in his car and the hegira was on for somewhere where land and living were more stable — a tragedy out of which came "The Grapes of Wrath."

The whole thing was a glaring indictment against man's lack of forethought, against his tinkering with the landscape, his going counter to nature's law. There were droughts in the days when the Indian and buffalo roamed the plains, but no legend records dust storms having driven the natives away. The Indian stuck close to nature. From the buffalo herd he took what meat he required, but left the grass roots in the soil.

In the wake of the dust came insistent demands for remedying the situation. Thus, in 1934 shelterbelt planting assumed national importance as part of a relief and rehabilitation program for the remaining residents of the drought-stricken area. The Government launched a ten-year program designed to shelterbelt some 1,262,000 acres of farmlands within a zone extending approximately along the 100th meridian from Canada to southern Texas. The cost was to be borne by the Government with the understanding that farmers benefitted would contribute half in the form of labor, maintenance and care. With President Roosevelt taking keen interest, the project proceeded along definite lines until the Pearl Harbor attack, December 7, 1941, whereupon it was temporarily discontinued. Today it is in a rather quiescent stage. However, from 1935 to 1942 about 18,600 miles of shelterbelts were planted on 33,185 farms, benefitting 238,200 acres. On the whole, the results of initial plantings are encouraging, though it may take another bad drought or other form of drastic setback to spur the program to completion.

Long ago California growers planted 2,000 miles of windbreaks protecting citrus orchards and truck gardens from hot wind and frost ravages. In the Southland the eucalyptus, or blue gum, a native of Australia, is largely used because of its fast growth; in from 10 to 15 years the tree reaches around 20 feet, forming a low windbreak. In Indiana truck gardeners have planted over 100 miles of trees. Not on record are many other plantings throughout the country. Originally the osage orange was planted around Midwest farms for hedge fences, windbreaks and posts. Later many hedge fences were torn out to make way for woven wire which now, in many instances, is being replaced by Rosa Multiflora, a native of China, thorny enough to become a permanent, stock-turning fence in a few years, and a habitat of birds, the farmer's best ally in combating insects.

Of late we've been wondering no end about what is going on behind the Iron Curtain of Russia. But in a recent edition of *Unasylva* we may read of one thing there, a vast 15-year project designed to reclaim a major portion of the waste steppes. Convinced that shelterbelts minimize wind and drought ravages, Russian leaders are out to increase crop yields in the Ukraine and Central Russia, the bread basket of the U. S. S. R. Known as the Volga Valley Authority, the project is the largest of its kind in the world.

Eight zones, distinct from shelterbelts around present cultivated farms and totaling the approximate distance from New York to San Francisco, are being established on ridges, slopes, river banks, lake shores and around reservoirs. The objective is to step up production on 142,725,000 acres by 1965. Each

zone will have from one to six parallel shelterbelts orientated at right angles to the dry, prevailing winds sweeping in from the Kizel Kum and Kara Kum deserts, making a huge part of the steppes a barren waste. The tree planting program is inspired by the following observations made during the past several years:

Snow is about twice as heavy on windbreak land, and where belts are in good condition, surface drainage is reduced to nothing; spring wheat making 31.5 bushels on the unprotected open steppe, and 45.4 bushels in shelterbelt areas; and oats, 51.9 bushels in the open and 60.5 bushels in tree-protected fields. Furthermore, over protected land the wind velocity is cut 35 to 40 per cent and moisture loss is reduced by one-third. In 1948 the worst drought in 50 years hit some sections, but fields protected by forest strips still made half normal production while unprotected fields produced only one-eighth as much.

Tree planting in the steppes dates back to 1830, though not much progress was made. Following severe droughts and famine in 1891, Russia named a soil conservation commission headed by Prof V. V. Dukuchayev, originator of the genetic classification of soils, now generally known. Largely through his work and recommendations, the vast, 15-year Volga project was launched.

Well, that's all in Russia and rather remote, you say. And aside from economic significance to the Soviets, what pertinence here? Just this: Turn the map of the United States at right angles to that of Russia and you'll see the same succession of climate and vegetation. On our map you note a belt of spruce and pine along the Atlantic seaboard; next, a growth of oak, birch, maple and similar hardwoods on the Appalachians and the Alleghenies;

(*Continued on page* 64)

Civilization has always found that disaster follows the indiscriminate chopping down of a country's trees.

Organic Farmer Bob Seeds

Part V of 200 Years of Organic Farming in the U. S. A.

By ALDEN STAHR

WHEN I was visiting my good friend and Pennsylvania organic farmer, Paul Keene, he handed me an old booklet that his dentist had given to him. It was entitled *How God Made the Soil Fertile* and it described Farmer Bob Seeds' organic farming practices fifty years ago, and reproduced photographs taken at his farm in 1899 and later.

This old-time Irish farmer with a flair for picturesque speech was truly the Edward H. Faulkner of the gay 'nineties and with his derby hat and wonderfully-appropriate name of Seeds cut quite a figure at farmer's meetings and on the Chautauqua circuit. So many of his hearers came up after meetings and asked if he had his soil talk in book form that he was forced to sit down and write one, but fortunately it loses none of the flavor of his platform manner – and wisdom. Here it is, though somewhat condensed:

How God Made the Soil Fertile

Fifteen years ago I sold out a good business in Tyrone City, Pa. and went down to the adjoining county – Huntingdon – and bought an old, worn-out, run-down and abandoned farm. Windows were nailed up, roofs letting in the rain, gates going without hinges, and fences had disappeared, and there had not been a farmer on it for seven years, because they could not find a man who would farm it.

The land was so poor that you could not raise anything, not even a disturbance; could not raise an umbrella on it; sometimes I found difficulty in raising my voice on it. It was the most desolate-looking place in my county.

My friends said I was the biggest fool on earth, and that I ought to have a guardian appointed over me; and, the day we moved down on the farm, Mrs. Seeds cried.

I began to haul stable manure from Tyrone City, two and one-half miles away, and I did not get many acres covered until that lead pencil told me it was costing me $20 per acre to cover it. Could not stand that; so, as I lived in the greatest limestone region in the state, I thought I would lime it. But I did not get many acres covered until I found out it was costing me $10 to $15 per acre to lime it, and, as I did not have a huge bank account or a rich father-in-law to lean up against, I made up my mind I could not stand it; so, about that time I was burning midnight oil, studying the soil. There are two things I have loved well enough to sit up until twelve o'clock at night and burn midnight oil with – the one was Mrs. Seeds and the other was that old farm – and I do not begrudge the time I spent with either of them.

If I had not loved that old farm and sat up with it until twelve o'clock at night, I never would have seen the boys take $60 per acre off it, or have sold the soil at $1.50 per bushel.

So, in burning this midnight oil, I found out that in the first foot of that old worn-out farm there was enough of *plant food to last from one hundred to one thousand years; but it was locked up and the plants could not get it.* I also found that three-fourths of the air was nitrogen, that was costing me at that time about fourteen cents per pound in the commercial fertilizer sack. When I found this out, I said to myself, "The Lord is unjust to have all this plant food under my feet and over my head, and have it locked up so that I cannot get it, nor the plants that I am trying to grow." But the longer I thought about it, the more I came to the conclusion that the Lord does not make many mistakes, and I would sooner have the Lord manage the weather in my community than any neighbor I have; for if the Lord did not lock up this plant food what would we do? We would use up every bit of it, haul down the very skies and use it, and starve the poor fellow to death who is coming after us. But the Lord says, "You shall not do it;" so he

How God Made the Soil Fertile

By BOB SEEDS

Copyright 1908
By ROBERT S. SEEDS
Birmingham, Pa.

locks it up, and neither you, I, nor any other man can get it, and use it in any other than nature's way, and the way I am about to describe in this little book.

Ages ago, this earth was solid rock. The rock began to disintegrate and the soil began to form. Vegetation began to grow, and that was the starting place in making soil fertile; and the more vegetation a section of the earth produced, the richer that portion became; hence the prairie was richer than the forests of the East, because the surface of the earth got more vegetation from the grasses than where the forests stood.

The Lord made all the acres of the land fertile from the Atlantic to the Pacific, and gave it to man to live upon, to prosper, and be happy. In doing so, he never hauled a wagonload of manure or a load of lime, nor bought a ton of fertilizer — and how did he do it? He did it with vegetable matter; and I thought that if the Lord could do it, I could do it. This sounds a little conceity, but I mean it.

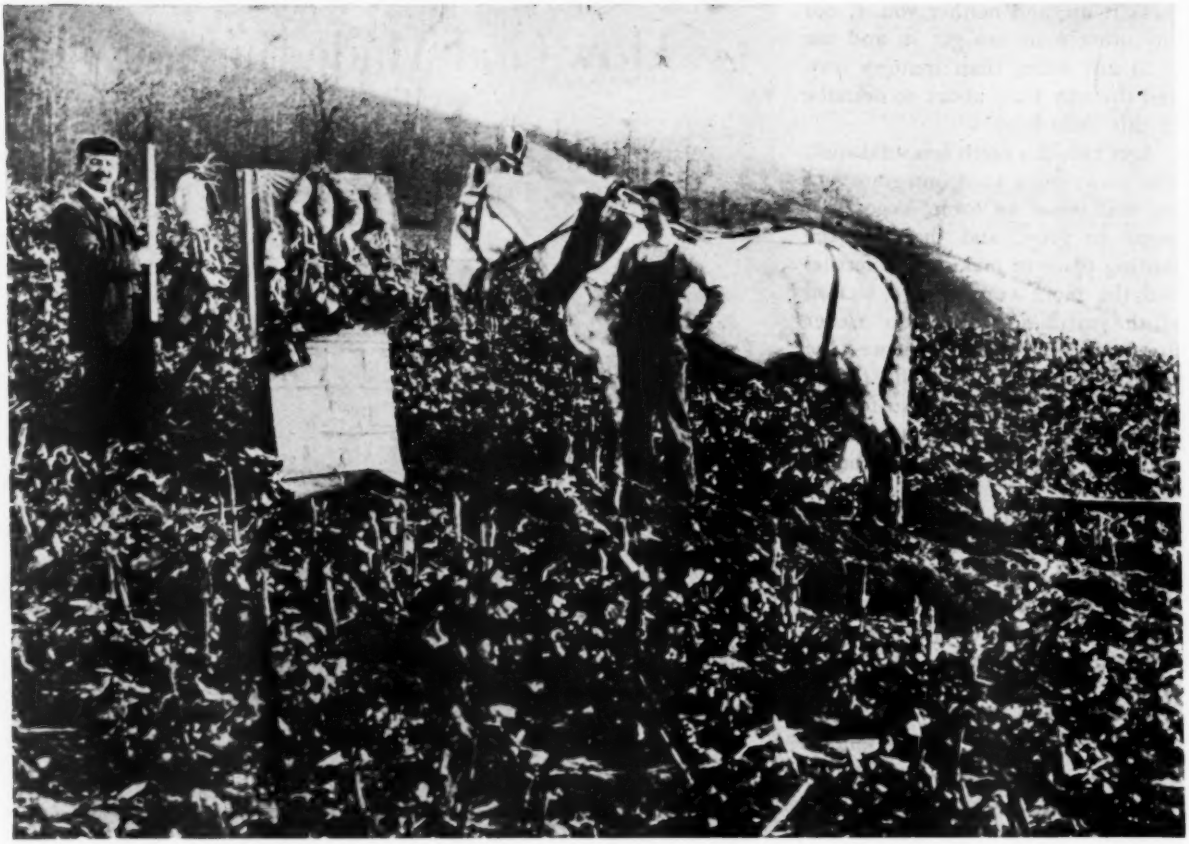
I have no use for a man who sits around whittling a store box, waiting for the Lord to turn something up for him; and the man who crops his land ignorantly until he gets it so he cannot raise anything on it, and expects to sit on his front porch and have the Almighty give him two hundred bushels of potatoes to the acre, will sit there for a long time. If you do not believe it, try it once.

If the Lord could do it with vegetable matter, I could do it. I knew he created plants that have the power to pull nitrogen out of the air and put it in little sacks on their roots, and other plants that have the power to pump up the potash and phosphoric acid from the subsoil.

The first plant I used was the crimson clover, and, when I began to use it, they all said it would not grow in Pennsylvania on the foothills of the Allegheny mountains, but that it was a plant for the South. But I sent to Michigan and New York state and got bulletins on the crimson clover, and found that they were not only raising the plant, but producing the seed; so, instead of going South for the seed, I sent to Michigan for it. I would sow it in my corn field in front of the cultivator the last time I worked the corn, and would scratch other fields with the spring-tooth harrow in the spring, when we had heat and moisture, and sow it there. The growth of vegetable matter I would get in my corn field I would plow down the next May or June, just before the vitality left the stock to mature the seed in the head, when the sap began to get sticky, so I would not sour the ground, and put that field to wheat in the fall. Then I would take another field that was covered with sorrel and goldenrod, plow it and cultivate it; for I believed then, as I do now, that cultivation released and made available some of that great store of plant food that was locked up. I would put that field to oats. Did not get much vegetable matter at first.

This was my rotation until I got my farm covered with grass; and I did not want to take a grass field for oats, but wanted my cornstalks for oats. When I wanted my cornstalk field for oats, and had to plow the field in the fall or early spring, the crimson clover plant did not seem to be what I wanted, as it did not seem to produce as many tons of vegetable matter to the acre as I seemed to crave.

The next spring I sent to Clearfield County, Pa., bought some buckwheat, and got some purple-top strap-leaf turnip seed and crimson



Bob Seeds plowing down his cowhorn turnips and crimson clover at One-hundred Springs Farm, November 21, 1899.

Organic Farmer Bob Seeds

Continued

clover seed. When I worked my corn the last time that season, I sowed in front of the cultivator the first strip in the field with the buckwheat, the next strip with purple-top strap-leaf turnip and crimson clover mixed, and the rest of the field with crimson clover.

The buckwheat did not seem to make much vegetable matter, and it seemed to disappear with the first frost. We had better corn where we had the turnips and crimson clover mixed. It seemed to shade the ground and help hold the moisture. The ground under it was dark brown, and, in some places, moldy on the top.

I used to sell agricultural implements, and in traveling through the country, I used to see good spots in oat fields. I was told that they were caused by pulling the turnips in the fall in the corn field, throwing them in piles, then cutting the tops off and letting them lay there, while the turnips were taken to the barn. The tops rotting and plowed down caused the good spots in oats – hence my going for turnip seed.

We put the corn and fodder into the barn. The field was then plowed for oats, and you could see that belt through the middle of the oat field where turnips and crimson clover was, as far as you could see the field. The oats was cut, put in the barn, and the field plowed for wheat; and two weeks after the field was plowed and harrowed, you could see that belt through the middle of the plowed field as far as you could see the field. This was easy, if you stop to think. I said the oats was better there than at any other place in the field; hence it was riper there than elsewhere in the field, and, in cutting it with the binder, it shelled more than where it was greener; so, the belt that could be so plainly seen was caused by the growing of the young oats.

Still, I was not satisfied with the purple-top strap-leaf turnip, for it grew on top of the ground. I wanted a plant with a longer root – one that would go down into the subsoil below the furrow after the potash and phosphoric acid. I took all the seed catalogues I had and went through them to find a plant that I could produce in a short time, and that had a long root. I had to see the picture of it, for I could not tell by the name of it what it would be like.

When I was going through Shumway's catalogue, I came across the picture of the cowhorn turnip, and

Clover twenty-seven inches tall produced at One-hundred Springs Farm on June 4, 1900, with decayed vegetable matter and humus.

I saw it had a long root, something like a cow's horn, and one that would go down into the subsoil below the plow.

That year I sent to Shumway and got cowhorn turnip seed; sent to Michigan and got crimson clover seed; mixed them together, and sowed in the corn field in front of the cultivator the last time we worked the corn. This was the start of all the controversy about cowhorn turnip.

That year, on the sixth of August, I was invited down to Perry County, Pa., to talk at a farmer's picnic. The day before I went into my corn field, dug up some crimson clover plants and cowhorn turnip plants, and I took them with me to that farmer's meeting, and there, before about two thousand farmers, I laid on my rule crimson clover roots six inches long and cowhorn turnip roots nine inches long. The point I want to make is this; inside of eight weeks, these roots were down in the subsoil after the potash and phosphoric acid – the only way to get it.

This grew on until November 21, 1899. After the corn and fodder were put in the barn, we pulled the plow in the field to turn under this growth of vegetable matter, and found we were turning under cowhorn turnips four feet long. When I make this assertion I see people in the audience putting their heads together, and I often wonder what they are saying to one another. Once a man whistled when I made this assertion; but, after I make this assertion, I modify it by saying, "that is, tops and all;" but the turnips proper were anywhere from eighteen inches to two feet long; and this I hang right onto, as we took a photograph of the plow turning them under.

We plowed all the field except a strip about forty feet wide, left at the request of the Agricultural Department of Pennsylvania, and that we plowed in the spring; but with the eye we could never detect any difference. Another kind of winter might have made a difference.

I will venture to say that was the funniest looking field you ever saw when it was plowed; and, if you and someone had been driving along the road at my place, you would have turned to the man at your side and said: "Here is where that man Seeds, who talks on farming, lives. There is a sample of his plowing." Sometimes the plow would turn the turnips under; sometimes cut them off; and sometimes the plow would push one of those big turnips up out of the ground about eight or ten inches, and there it would stand; and the field looked as though we had gone in there and plowed down a lot of Indians, heels foremost, and

Organic Farmer Bob Seeds

Continued

their heads and feathers were sticking out of the ground.

That January we had a ground thaw, and I put on a pair of rubber boots and waded out to see the field; and I could smell it long before I got to it.

The next spring, when we harrowed the field for oats, where one of those turnips that was pushed up out of the ground had frozen and decayed *there was a dark brown spot;* that is the milk in the cocoanut – decayed vegetable matter – that which turns to humus, holds the moisture and helps unlock the plant food that is locked up and unavailable in the soil.

I am no chemist, nothing but an ordinary farmer, but my other habits are good. From the most careful figuring I could do, and from the best authorities I could find, I was plowing down twenty dollars' worth of nitrogen, potash and phosphoric acid to the acre – and the cost to me was but eighty cents. Later, when I used the cowhorn turnips and dwarf Essex rape, I brought the cost down to fifty-five cents per acre.

That field was sown broadcast to oats, put in with the harrow without any commercial fertilizer or barnyard manure, for the first time on that old worn-out farm, in one of the driest seasons we ever had in central Pennsylvania; and, when the binder was cutting that oats, we had a photograph taken of it.

That same season, on the fourth day of June, we took a photograph of a red clover field that was twenty-seven inches high – the result of moisture and plant food created and released with vegetable matter and humus.

It has been shown that soil that is filled with decayed vegetable matter and humus, from one crop of crimson clover plowed down, will hold fifty tons more water to the acre than soil that is not. If you figure how much water you must have to raise a crop of corn, oats, potatoes, hay, etc., you will see the value of land that has the power to hold water.

We had a farmer in Pennsylvania who got his farm into such a condition that he said spring rains were a nuisance.

I have watched the soil until I make this assertion: that soil that is filled with decayed vegetable matter and humus is warmer in the wintertime, cooler in summer-time, wetter in dry weather, and drier in wet weather.

In Somerset, Pa., on December 4, 1907, when I made this assertion, men by the dozen immediately opposed my statement, by saying that such land could not be drier in wet weather.

Never was I driven into a closer corner. I thought and thought in order to find an illustration that would make my idea clear to them, and that would back up my assertion. At last I selected two of the leaders in the opposition, and put one of the following questions to each: I asked the first man to suppose a level ten-acre field, the one half of which had had vegetable matter and humus worked into it, and the other half of which had been left untreated. This being done, and the field plowed, I asked him to suppose further that rain should fall upon the whole field from Monday until Friday, and that on that day he should take some other man to an elevated place and ask him to say which half of the field was the drier. I then asked him to tell me what this other man's reply was likely to be. He hung his head a moment, and then confessed that in his opinion the man would select that half which had had the vegetable matter and humus worked into it.

I then turned to the other leader in the audience, and spoke to him as follows: "If you take two three-gallon buckets, and put two gallons of soil filled with vegetable matter and humus into one of them, and two gallons of soil devoid of it into the other, then pour one gallon of water into each bucket, which lot of soil would appear to be the drier?" He paused, then said that the soil having vegetable matter and humus in it would be the drier. The reply of either could not have been otherwise.

(Next month read the rest of Bob Seeds' story.)

Doctoring Poultry Water Sometimes Harmful

The practices of supplying medication to water which poultry will drink as a preventive measure for various diseases can prove to be detrimental to the growth of the poultry, according to Dr. A. A. Goodman, veterinarian for the Colorado A & M College Extension Service.

He says that such drugs are usually distasteful to the birds and will prevent them from drinking all of the water they should consume in order to keep them in a good healthy condition.

He says that drugs are sometimes supplied to good advantage to sick or disease exposed birds for a limited time. But to medicate the water continually as a precautionary measure against disease is considered by most veterinarians and other authorities as a bad practice.

Goodman suggests that, instead of using so many pills and nostrums in the poultry water, poultrymen could spend their money to better advantage on good feed and management.

Experiment Station Report

Fast Milking Gives Best Results

Your cows will give all their milk only when you accustom them to fast milking and a regular schedule.

"The whole milking process, including preparation for milking, shouldn't take longer than four or five minutes," says M. H. Alexander, dairy scientist at the Illinois College of Agriculture.

Each milking time, prepare the cows by massaging udders with lukewarm water. Do this one-half to one minute before milking. The effect of the milk let-down is lost if too much time lapses between massaging and milking.

It seems to make little difference in production whether or not you feed cows while they are being milked, says Alexander. The important thing is a good milking procedure carried out the same way day after day.

Fast milking is necessary because friction from machines left on the udder over five minutes will injure tender udder tissues. This encourages mastitis in the same way that a poorly adjusted milking machine will eventually cause injured or diseased udders, Alexander points out.

The U. S. Bureau of Dairy Industry recommends that milking machines be set so there is not more than 11 inches of mercury at the teat cup. However, each cow must be treated individually as to length of time machine is left on cow. That is because speed of milking is determined partly by heredity.

Heredity also partially limits the level of milk flow from one lactation to the next. But the kind of care and handling you give your cows is important too. Good rations based on milk production and pasture conditions, proper shelter the year 'round, and plenty of fresh water along with a fast milking routine will insure you top production from your herd.

Raindrop Jets Blast Soil

"Gulley washer" is an expressive farm term for a driving rainstorm with its results that farmers dread. Some such term as "soil splasher," or "pounder," or "bouncer" might have come into use if farmers had been as quick to realize the erosion injury such a hard rain does as it falls and strikes the soil surface. This injury comes before the gully washing develops — and, indeed, the splashing contributes to the gully washing.

It is not surprising that farmers failed to realize the importance in erosion injury of this rapidly falling water. It is only within the last few years that research has identified it as important enough for scientific study and measurement. The measurements revealed its importance, says the U. S. Department of Agriculture. If a 2-inch rain were delivered all at one time it would have energy to raise a 7-inch layer of soil a yard into the air, points out J. H. Stallings, research specialist of the Soil Conservation Service.

Hydraulic mining makes use of the power of a stream of water to rip into a hill and dislodge the mineral bearing soil. A hard rain is divided into millions of small swiftly moving jets, each striking with energy to cause a splash on bare soil, ripping loose small particles of soil and splashing them into the air. On even slightly sloping fields, the larger part of splashed soil comes to earth down hill from where it started. Even if no water flowed off the field, this splashing would in time thin the soil at the upper part of the slope.

The remedy for splash injury is easy to see once this hydraulic jet action is understood. It is to take the energy out of the raindrop before it strikes the soil. A wool blanket spread over the soil surface would do the work. But the practical way is to provide a blanket of plant material — alive or dead, a growing crop, mulch, or stubble. The important point is cover over practically all the surface so that when a rain drop jet strikes it loses energy on the cover without blasting loose and carrying soil particles in its splash.

Find Inactive Thyroids In Shy-Breeding Cows

A high producing cow doesn't pay her way if she doesn't keep up production year after year. A plump beef cow gives tender beef, but she may not have enough calves.

Delmar Young, extension dairyman at the University of Delaware, says that research in Wisconsin on dairy cattle, and in Oklahoma on beef cattle, has found that inactive thyroids may be one of the causes of breeding failures in cattle.

"An Oklahoma veterinarian points out," says Mr. Young, "that selection of beef cattle has been toward cattle with slowly functioning thyroid glands because they fatten easily."

"Insufficient thyroid secretion may hold back the reproductive system," says Dr. G. T. Easley of Sulphur, Oklahoma.

The Wisconsin people found that 40 of their repeat breeders had inactive thyroids. Although the evidence that this caused failures in breeding was not clear cut, more research is being done along that line.

TERRACING

Here is the first of a group of articles, written especially for the novice farmer, on farming techniques. Future articles will treat cultivating, plowing and other farming arts.

Photos by the Soil Conservation Service

Building a diversion terrace on the farm of Austin McCloud, Belington, West Virginia.

WHAT to do with a sloping field is one of the eternal problems of agriculture. The ancients had a solution to it – they built bench terraces, vast series of steps hacked out of the mountainsides. Even today, bench terraces are being used in land poor areas. But the expense of building them is great and, even though the old terrace walls are usually kept in a state of repair, very few new ones are being built.

However, there are still times when a farmer might want to build a walled terrace to tame a particularly vicious slope. Therefore, the second portion of this article is devoted to a valuable coverage of bench terracing by Frank D. Steiner.

The graded terrace, which is extremely well adapted to use in the U. S., is not too closely related to the bench terrace and the two should not be confused. No laborious and expensive remaking of the field is required when making these terraces, which are merely ridges designed to catch and control the flow of water down a slope.

C. L. Hamilton talks interestingly of the history of the American terrace in his pamphlet *Terracing for Soil and Water Conservation*. "During the latter part of the eighteenth century and the beginning of the nineteenth century," he says, "farmers in the southern states began to use ditches and furrows across the slopes of cultivated fields to intercept runoff and retard erosion. This practice was probably introduced by some of the early immigrants from Europe. The term 'terrace' in connection with this practice appears to have been used in this country as early as 1847. Some of the principles used in installing these early hillside ditches were correct, but the effectiveness of the measures themselves was usually counteracted by inaccurate installation and lack of supporting practices. The evolution from these early hillside ditches to the modern agricultural terrace has been slow and gradual and is the result of the efforts of many people."

The Soil Conservation Service Will Help You

The individual farmer need not worry about the actual problem of building terraces. The Soil Conservation Service will usually engineer their construction for you.

However, it is up to the farmer himself to decide if his soil actually needs terracing. It is good to remember that terracing is not a cure-all for erosion nor is it a substitute for less drastic measures such as the application of organic matter, a good crop rotation, contour cultivation and strip cropping. Those three common soil conservation measures

A flat bottom diversion ditch covered with vegetation. Wheat is planted above and below.

Terraces can be plowed and planted just like the rest of a field. Here a Lancaster County, Pa. farmer is making the first cut in plowing a terrace. Note that the soil is turned toward the terrace ridge.

will usually provide satisfactory erosion control, without resort to the expense of terracing. But if slopes are long, soil impervious and rainfall heavy, agronomic measure may not hold all the water and terracing will be practical.

First, take a good look at your land. Roads, property lines, drainage-way depressions and the general lay of the land should be taken into consideration. Even adjoining lands must be considered, because water from them will oftentimes drain onto your land. Consider all necessary terracing for the whole farm at one time, even though you are considering only working with a part. The need for rearranging terraces and drain ways later will be eliminated.

Terrace systems are usually worked out in drainage units, taking into consideration the entire area drained by a certain outlet. Sometimes, the land of your neighbor will be a part of one of your drainage units. In a case like that it is best to try to work out some method of terracing the whole drainage unit, the cost being shared by you and your neighbor.

Starting From the Bottom

With terracing, as in almost everything else, you have to start at the bottom and work up. The final drainage outlet is really the nerve center of your diversion system. It must be protected with well-established sod or forest litter in order to be able to withstand the erosive influence of the torrents of water that it may be called upon to transport.

Even the construction of the terraces themselves is best started at the lowest point. The usual procedure is to start staking out the gradually rising line of the terrace from its drainage outlet. At this point, experienced soil conservation men with the proper equipment are needed, for there is quite a knack to laying out a terrace that must rise exactly one inch or two inches every hundred yards.

Even if the terraces are carefully

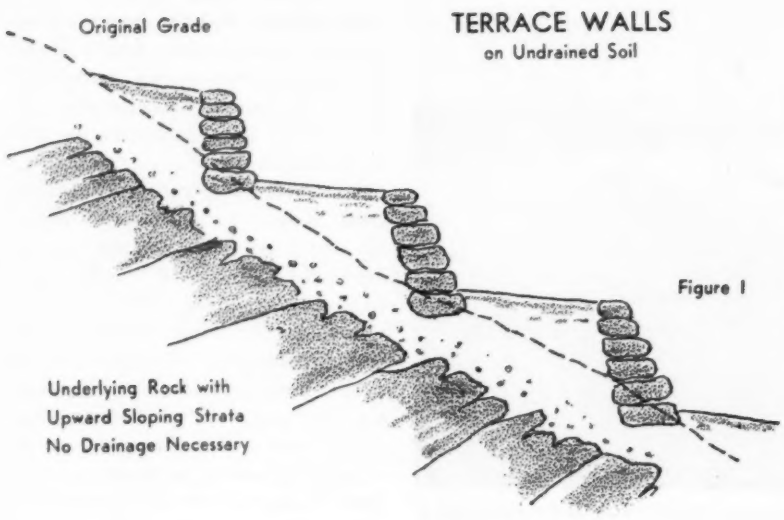


Figure 1

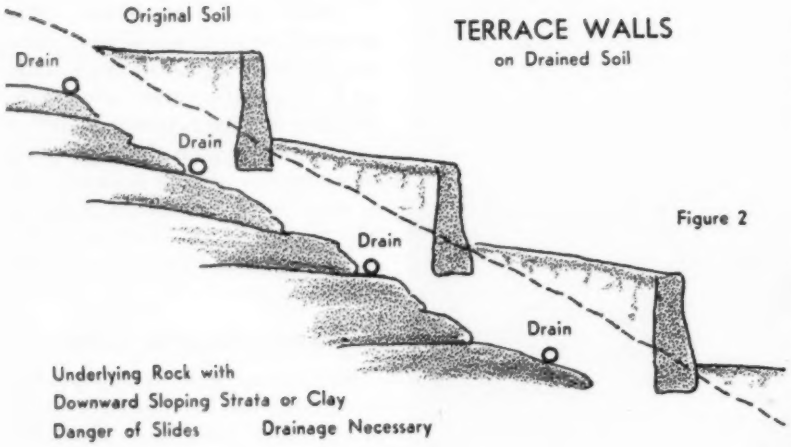


Figure 2

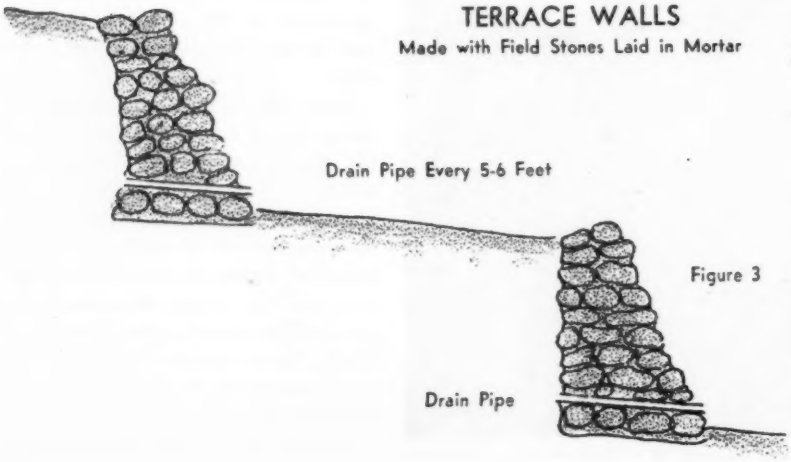


Figure 3

Terracing *Continued*

engineered by experienced men, they must often be realigned to iron out bugs and obstacles to the correct flow of water.

Although part of the work of constructing the terrace can be done with ordinary plows and disc plows, specialized equipment whose use must be contracted for is almost always required. If the Soil Conservation Service is handling the job for you, they will recommend a contractor who has the proper equipment and who knows how to use it. Terracing plows, blade graders, V-drag scrapers and slip scrapers are all used with good results.

Usually, all of the earth used in building a terrace is moved from the upper side, especially when building the broad-channel type. However, in some cases a part of the earth is moved from both sides.

Terraces Are Money Makers

A well constructed, rounded terrace is not much of a hindrance to normal cultivation. The terrace itself can be plowed, seeded and harvested just like any other piece of land.

But the terrace also works for you actively by conserving rainfall and encouraging it to sink into the soil. That quality of the terrace is perhaps one of its greatest advantages — a dividend in addition to effective erosion control.

Constructing Bench Terraces

By FRANK D. STEINER

THE Hunza people who live on a high plateau in the Himalayas had been terracing their mountain slopes long before the white races in the Western Hemisphere felt the need to do so. Thanks to this prac-

tice and to healthy eating habits, the Hunzas have survived in a most rigorous climate and have set an example of good farming, health, efficiency and longevity although they do not enjoy any of the mechanical conveniences taken for granted by the modern farmer.

Shortage of land need not always be the first motive in terracing. It pays to terrace on sunny slopes in order to consolidate the soil, make cultivation and irrigation easier and prevent erosion.

Originally nature did a much better job by throwing a green carpet of lucious vegetation over hills and mountains which, in its final stage (trees and bushes), is the best soil preserver. Age-long experience leaves no doubt that terracing and the cultivation of deep-rooted plants is the most effective – if not the cheapest – substitute.

The graded type of terrace discussed in the first part of this article cannot be used on slopes steeper than 10 to 12 per cent. Bench terraces, which we are discussing here, can be used on much steeper slopes, but should be planted to high paying crops that will pay back the investment for their construction within their life span.

Construction Details

Terrace walls seldom exceed two to three feet in height and are constructed along the contour lines of the terrain. Alleys or paths running at right angles to the walls and spaced 50 to 100 feet apart must be provided for access. The terrace walls are usually built of materials found on the site (stones, rock, wood, etc.) or owned by the farmer (reed, straw, gravel, sand, cement, etc.). Most terrace walls are built of rock skillfully laid with or without mortar.

Before terrace walls are built the farmer should ascertain that his land is not subject to sliding. The top drawing on page 28 shows a cross section of a slope resting firmly on rock whose strata are turned upward. That soil cannot slide. The contrary is depicted in the drawing under that. The top layer of that slope has no grip on the underlying rock because its strata are turned downward and its surface becomes smooth and slippery after a spell of rain. Such slopes must be drained before they can be terraced.

All terrace walls must be slanted backward as shown, and be fairly heavy so that the banked up earth cannot overturn them. The wall resists by its own weight and therefore has to be bulky and well constructed. Slots or weep holes must be provided at the base of the wall so that no water can accumulate behind it at any time.

The walls may also be made of concrete or brick if field stone is not available. It has been found that a mixture of coarse gravel (without fine particles) and cement (6 parts of coarse gravel and one part of cement) make a suitable concrete for terrace walls. Walls built of that cement require no drain holes since such concrete is porous and allows no water to collect behind the wall.

When pouring walls of ordinary concrete the mixture should be made in the following proportions: 1 part Portland cement, 2 parts of sand and 4 parts of gravel the size of which should not exceed 1½ inch. Field stones up to 6 inches in diameter may be incorporated during the pouring provided such stones are well imbedded in the concrete. Using stones in this manner saves quite a bit of concrete and does not impair the stability and strength of the wall.

A faggot wall can also be made with rods and saplings found on the site or nearby. Well constructed faggot walls may last a generation. The round timber used should be stripped of bark. In order to retard rotting, the round wood is held over a fire long enough to char the surface. Charcoal is an excellent preservative against any kind of rot.

The foundation posts must be given an initial backward slant similar to that of the stone walls. The limber sticks and saplings are then woven around these posts and treaded down to make a tight wall. Nails are driven in to prevent rising up. This terrace wall is really inexpensive if materials are found on the site, and there is absolutely no need for drainage.

Faggot walls are also extensively used in the consolidation of river banks. The ordinary life of a faggot dam along a waterway is 20 years.

Actually, almost any building material can be used to construct terrace walls. Re-enforced concrete "boards" can be stacked up to form a ribbed wall that is very effective for terracing purposes and for consolidation of stream banks.

American Bench Terraces

Modified types of the bench terraces discussed above have been used quite extensively in California for citrus groves and in Puerto Rico for the raising of vegetables.

The California terrace is constructed over a period of years after the young trees have been planted and the irrigation lines laid out. Each year more and more earth is moved into the correct position until, when the trees are almost mature, the terrace is finished.

But these California bench terraces are different from European terraces in one major respect. Sturdy rooted grasses are used to support the terrace instead of walls. Puerto Rican terraces, constructed by the Soil Conservation Service, also utilize "grass walls."

Inasmuch as all bench terraces, both the walled type and the grass supported type, expose a certain amount of infertile subsoil material, it is wise to consider keeping steep slopes in sod or pasture before deciding that terracing is worth while. However, some readers of this article may get a great deal of pleasure out of terracing – and rendering extremely beautiful – a precipitous slope that has always been an eyesore. If help in engineering your terracing work is not available from the Soil Conservation Service, it would be wise to get the advice of a competent agricultural engineer.

Mr. Earl Reed, the compost maker, shows the large lumps of black adobe soil that made up most of the 5½ acre ranch before the organic methods were begun.

Rancho Mulcho

A Californian finds that mulching works best on adobe soil.

By HAROLD L. SNOW, M. D.

WHILE attending sessions of the American Academy of Applied Nutrition three years ago, we became interested in organic farming and decided to experiment with it.

If a person's health were to be improved by eating proper foods, it seemed likely that greater health could be expected if those foods were grown on correctly prepared soils.

We had spent two years doing some blood chemistry studies and decided to see what we could learn from similar probing investigations on the soil. So, first, we took samples of the soil from our 5½ acre Palos Verdes ranch at Rolling Hills, California, and had soil tests run. We found that the calcium was as deficient as that of the worst soil in the state of California. The soils of some of our neighbors were found to be equally poor. Tests of our home grown vegetables revealed the fact that our carrots were approximately 45 per cent deficient in calcium. Standards published by the Heinz Food Company were used in these vegetable analyses.

During the time of this research, we took one hundred samples of vegetables from various markets in Southern California and found that the root vegetables averaged approximately 44 per cent deficient in calcium. The exceptions to that were the tests on potatoes, most of which are shipped in to California from the inter-mountain states. They were not calcium deficient.

One of our neighbors, who has written several books on nutrition, looked at our heavy, cracked, adobe soil and exclaimed that she would suggest mulching just to save some of the $15 being spent per month on irrigation water. That sounded like a good idea. We also knew that mulching and other organic methods would help produce better vegetables, fruit, flowers, and shrubs. So we started looking for materials to use for mulch and compost.

The fruit trees had been covered with red scale, aphids, ants, and a destructive disease of the bark. Much of the fruit was small and some trees had never borne any fruit. They were already eight to ten years old. The lawns were thin and full of weeds and moths.

We began with earthworms, and bought approximately 23 thousand of them from a breeder. The worms were placed in the ground near the fruit trees and in the ground prepared for vegetables, and flowers. In order to be assured of sufficient food for the worms, we provided them with mixed rabbit and chicken manure. Six tons of it were hauled to the ranch by a friend in nearby Lomita. We distributed some of the manure on the surface of the ground, covering it with six inches of bean straw, and used the rest of the manure later on in the composting program.

Nineteen hundred acres of Garbanza chick peas, or "Garbanza beans," as they are called locally, were harvested here in Rancho Palos Verdes a year ago, and we were fortunate to receive as a gift much of the straw from these beans. We used approximately 130 truckloads of bean straw. Then came about fifty-five loads of stable manure and about fifteen tons of cow manure. Much of these products were used in sheet composting in the orchard and garden; the balance of it was made into approximately one hundred tons of compost. One man was kept busy working on the compost during his spare time from August to April. It was stacked, watered, and turned three times.

Instead of wide, deep crevices in the thick adobe soil as had previously existed, there are now none. The soil is soft and full of humus. When one walks over it, the ground crunches pleasantly under one's feet; and, even when the soil is wet, one's shoes do not become muddy because of the decaying bean straw mulch underfoot. More than half of the compost has already been distributed to areas of the orchard, vegetable garden, berries, flowers, and lawn. But there is still space for the rest of it.

In making the compost, we used the methods learned through *Organic Gardening* and *The Organic Farmer*. Manures, bean straw, stable manure, and bacterial inoculator of the compost heaps were used, as well as five tons of oyster shell flour for its calcium and trace minerals and approximately six tons of tuna fish from the local canneries (consisting mostly of skins, bones, eyes, fins, insides, and discarded dark meat, together with some of the whole fish that were spoiled from crushing when the fish arrived at the cannery). This fish was used between the layers of bean straw in several of the compost heaps.

We also bought ten tons of dried sludge recovered from the Los Angeles County sewage plant, and used it in one of the compost heaps. After it was completely composted there was no sludge odor to it, but we decided that the cost and labor involved did not make this an economical method of producing compost.

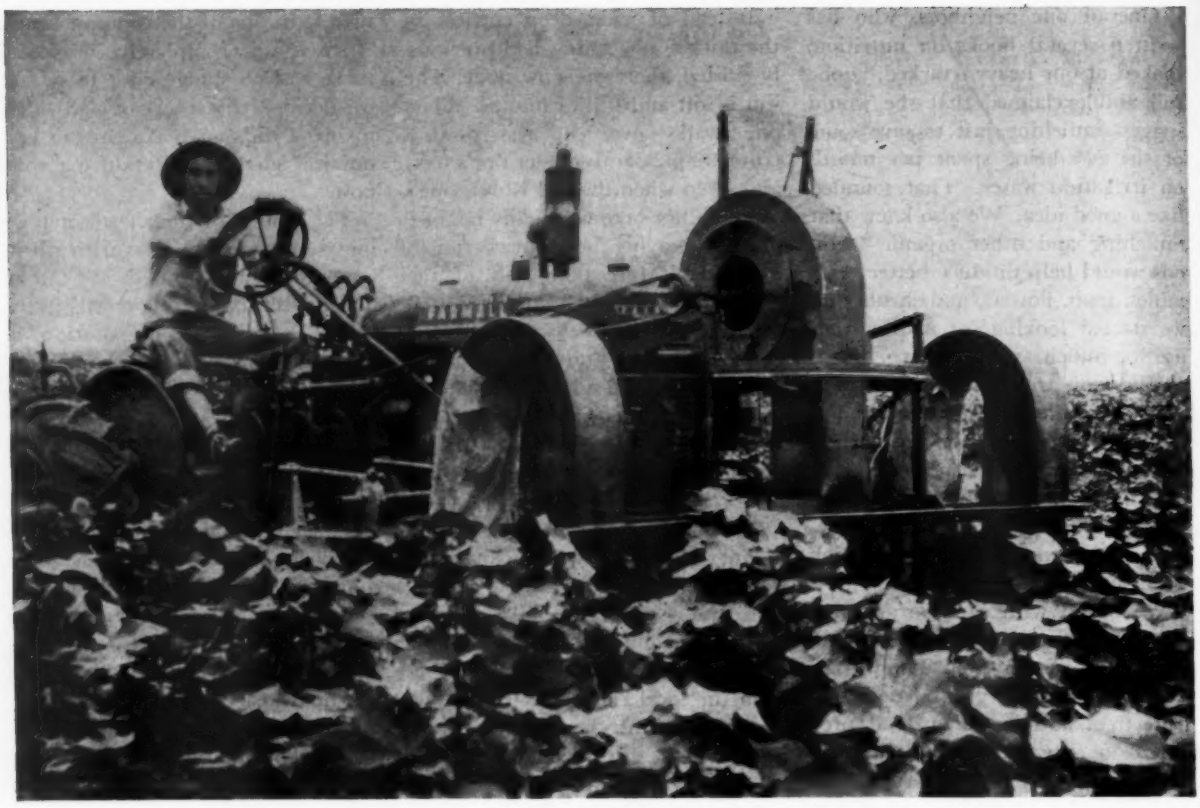
The results of the sheet composting method are the ones with which we are now most pleased. We intend to use sheet composting mostly in the future, except for preparation of compost for the potted plants.

We hesitated to use the roto-tiller, being afraid it would injure the earthworms. Several of our organic gardening friends, however, suggested that the earthworms, hearing or feeling vibrations of the machine as it approached, would have enough time to get out of the way before it could injure them. This sounded like wishful thinking, but we cultivated with it anyway. I doubt that too many earthworm casualties resulted. There are thousands of earthworms about half an inch long to be found near the surface of the bean straw mulch.

So far, we have not noticed any marked reduction in the water bills as a result of mulching, but our joy has become great in the multitude of pleasures derived from the renewed garden and orchard. The previously

(*Continued on page* 61)

Phosphate rock waiting to be applied to the soil of Rancho Mulcho.



A two row Nisbet bug catcher bugging a field of cotton.

Organic Farming Advances

Equipment makers are playing into the hands of organic farmers.

MANY is the time that the organic farmer has had a hard row to hoe. For instance, almost every farmer who has sworn off insecticides has at some time or another had to sit back and watch the bugs grow fat on his crops, for when a bug gets hungry enough he just won't listen to reason and will sometimes eat even organic crops.

Admittedly, such situations are rare, but disquieting no end when they do occur.

Now, we have a weapon. A man from Texas has come forth with a veritable super bazooka – it's a bug catcher, that's what it is. Comes down on your cotton or sorghum or potatoes like a V2 rocket in the night and knocks the bejabbers out of any itinerant parasite, and it doesn't

even leave radioactivity or scum in its wake.

Actually it's sort of a reversed vacuum cleaner. It doesn't suck, it blows, but it blows any and all insects right off the plant and into a bag. Simple. And it has got other virtues, something you can't say for DDT or any of its stripe, which give you nothing but trouble at every turn of the road. This bug catcher saves our friend the ladybug. She gets sucked into the bag like all the rest, but she's got the intestinal fortitude to stick out 24 hours submerged in a tank of water — an ordeal that will flatten any evil-doing bug. The result — the weevils and the worms and the stink bugs drown in the submerged bag while the ladybug just bides her time. Open the bag and she flaps back to the field.

And another thing about the bug catcher, like sulphur and molasses, it's a one shot treatment. The prescription never changes. No bug can develop immunity to the bug catcher except by developing suction cups on its feet, and, knowing the stubbornness of the process of evolution, that isn't likely.

The entomologists tell us to dust with poison, using almost as many different kinds of poison as there are insects. They all have to be treated individually, so they say. They tell us to dust early for pre-square control. Then they say not to dust early because it will kill our friend the ladybug, and then we will have aphids.

It gets so after a while that you are just about ready to cry, like the little boy who just started school. When he came home crying one afternoon his mother asked him the trouble. He said, "Last week my teacher taught me that two and two makes four. Now she tells me that one and three makes four. How am I ever going to know what four is?" We are not little boys any more, but some things can be very confusing.

This Nisbet bug catcher was especially designed to take the confusion out of cotton growing, which can be quite confusing at times.

Cotton likes an acid soil. When alkaline, it grows more foliage and less fruit and becomes an appetizing morsel for plant lice, which thrive on alkaline reacting plants. The calcium arsenate that is used to kill cotton pests is definitely alkaline and causes an alkaline reaction in the soil and in the cotton plants.

The result is only to be expected. After cotton is dusted with calcium arsenate the plants begin to produce more foliage and less fruit. The lice thrive and increase by leaps and bounds and make honey dew which drips from the leaves.

Still worse, the poison kills off the insects that feed on the lice and so the poison upsets the balance of nature in favor of the lice. Calcium arsenate has been little criticized because no one had much of a better suggestion for controlling boll weevils.

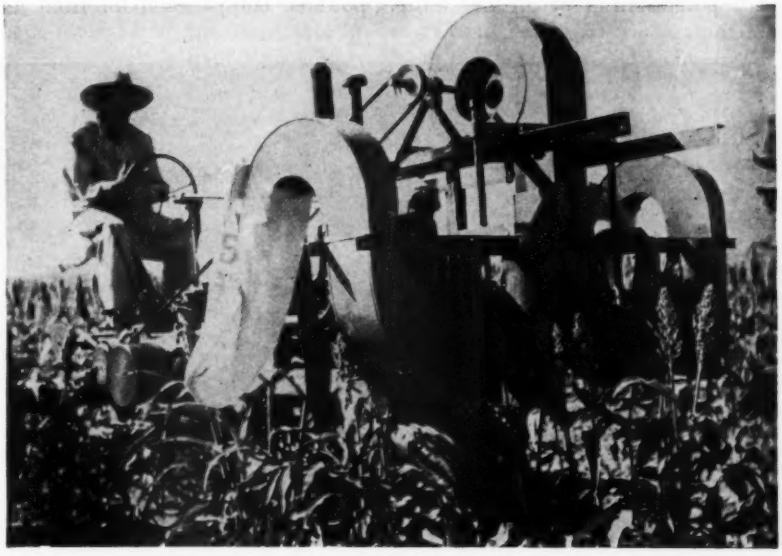
The bug catcher eliminates all that fussing with chemicals. Now though, we're not going to say that this bug catcher is faultless and is going to be the saving of agriculture. We're reserving final decision until we've had a chance to roll one over a crop of Pennsylvania potatoes. But then it has one good point in its favor — it's cheap. Costs only $290.

A New Source of Organic Matter

THE organic farmer's most important task is the obtaining of organic matter. Therefore, we greet with open arms any implement that will make this task easier.

The brush chipper undoubtedly is a machine that can make available to farmers organic matter that is now unavailable to them — and make it available in large quantities. Tree prunings, wood lot brush, sawmill slabs, old fence posts and almost any other type of waste wood that is found around the farm can be chopped up and returned to the soil. The number of tons of such material is truly astronomical and can influence the average organic matter content of American soils if fully utilized.

A number of experiment stations have been trying out brush chippers and have evaluated the worth of the great quantities of chips produced. They can be utilized effectively as cattle bedding and as a mulch around trees or as a blanket mulch on a



Taking the worms out of maize with a bug catcher.

Mounted on a tractor, the Fitchburg brush chipper is relatively inexpensive and mobile.

Organic Farming Advances

Continued

field. There are points for and against their use as cattle bedding, but the conclusion usually is that their use is warranted.

A farmer may not have to own a chipper to benefit from its use. Tree surgeons, power companies and saw mills are buying large numbers of chippers, and if you can get in touch with them, they will probably be glad to let you have the chips or may even deliver them to your door if convenient.

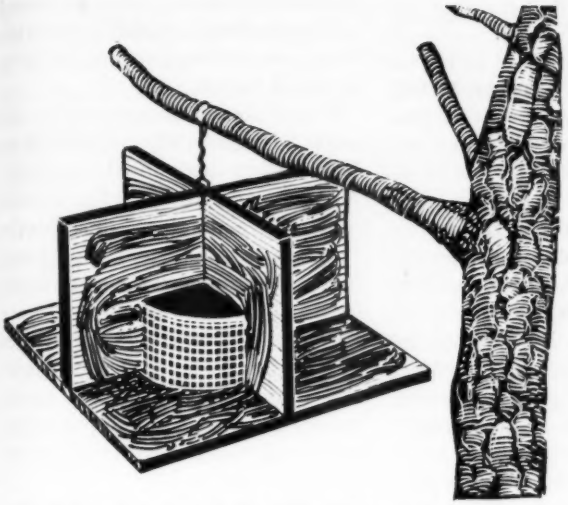
However, if you want to realize the full potentialities of all the waste wood that is available to you, you will want to own a chipper of your own. Utilization of tractor power by a chipper made by the Fitchburg Engineering Corporation makes it possible for an individual farmer to own a chipper for a fairly reasonable sum.

Chippers mounted on trailers and carrying their own power may be more effective, but their price lifts them into the class of custom equipment that must be shared by a group of farmers to pay for itself. Self-powered chippers sell for from less than $2000 to $2600. But you can buy a chipper that will mount on a tractor or Jeep for about $700 complete, not really too high a price when you consider the high prices of everything these days.

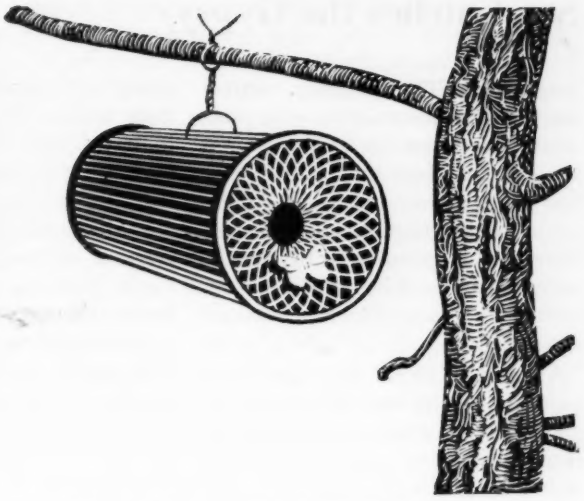
And, as far as we know, there is not much need to worry about the strength and capacity of the rotary brush chipper. They have just a few moving parts and are built to take punishment.

It is an experience to see one operate. It can take a whole limb of a tree, bite it, chew it and spit it out in a second or two. Once the chipper takes the first bite, it draws the rest of the limb in by itself.

Chopping up bothersome brush in a woodlot is a simple task for a chipper.



The Shaw trap, used in early gypsy moth survey experiments.



The Graham used extensively in present gypsy moth surveys.

Sex Catches the Gypsy

Entomologists show that you can't underestimate the power of a woman.

By WILLIAM ACKERMAN

REMEMBER the old expression, "There's more than one way to skin a cat?" Well, this article is not about cats, but about a particular insect, the gypsy moth, and there is more than one way to control it. We hear so much about chemical sprays and toxins for the control of this and that insect that it is quite refreshing to talk about natural control measures that do not involve the use of poisons. In many cases where chemical sprays are used, further investigation into the habits and life cycle of the insects involved, might disclose effective natural methods of control.

The gypsy moth, an old world tussock moth, was accidentally introduced into eastern Massachusetts about 1869 and is now found also in many surrounding states throughout New England. The caterpillars of this moth do great damage to forest trees and have presented the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture with a serious problem for many years.

The destruction caused by the caterpillars of the gypsy moth does not directly influence the individual farmer, unless of course, part of his farm is in woodland and he is within the boundaries of the presently infested area. Indirectly, all farmers as well as every other citizen should be concerned, because this destructive insect force, if allowed to go unchecked for even a comparatively short time, might easily contaminate large portions of our total forest resources.

The principle purpose of this article is to illustrate a phase of the excellent work being done by some government agents in combating disease and insect infestations that are attacking the plant life of our country. Although the individual farmer can do but very little in the fight against the gypsy moth unless he is in or near the region of infestation, an appreciation and understanding of what is being done is in itself both interesting and valuable.

If a farmer has woodlands near the present habitat of the gypsy moth he might do well to periodically survey his woods for possible signs of

Sex Catches the Gypsy

Continued

infestation. The trapping method described in this article is only practical when used in a coordinated campaign to limit the area of gypsy moth infestation and is not to be practiced by the individual farmer. However, cooperation with government agents in this case is both desirable and profitable for everyone concerned.

Control measures for most insect pests are usually not undertaken until the insect has increased in population to levels that would cause severe economic loss to a particular crop or product. In gypsy moth control work, however, the maximum effort is usually expended near the edges of the infested area, where the populations are, in general, extremely low. The principle object in this case is to confine the region of infestation and prevent the expansion of the area infested by the moth.

At places near the boundary of the general infested area, the gypsy moth is often present in such low concentrations that it might not be discovered through normal observation methods for several years. Nevertheless, if left to increase normally these infestations could jeopardize nearby uninfested areas and make future control operation more extensive and, therefore, more costly.

Late in the nineteenth century, Forbush and Fernald found that male gypsy moths would fly considerable distances to traps containing living virgin females. The first trap, known as the Shaw trap, consisted of a wooden platform upon which a perpendicular structure in the form of a cross was erected. In the center of this unit at the base, a screened cage was placed in which virgin female moths were contained. The base as well as the wings of the trap were coated with a sticky gum of crude resin and crude castor oil, which was applied while warm. This structure was suspended from a branch of a tree or other support.

Even this crude trap was very effective in attracting and capturing male moths. In some tests it was indicated that males had been attracted for a distance of more than half a mile.

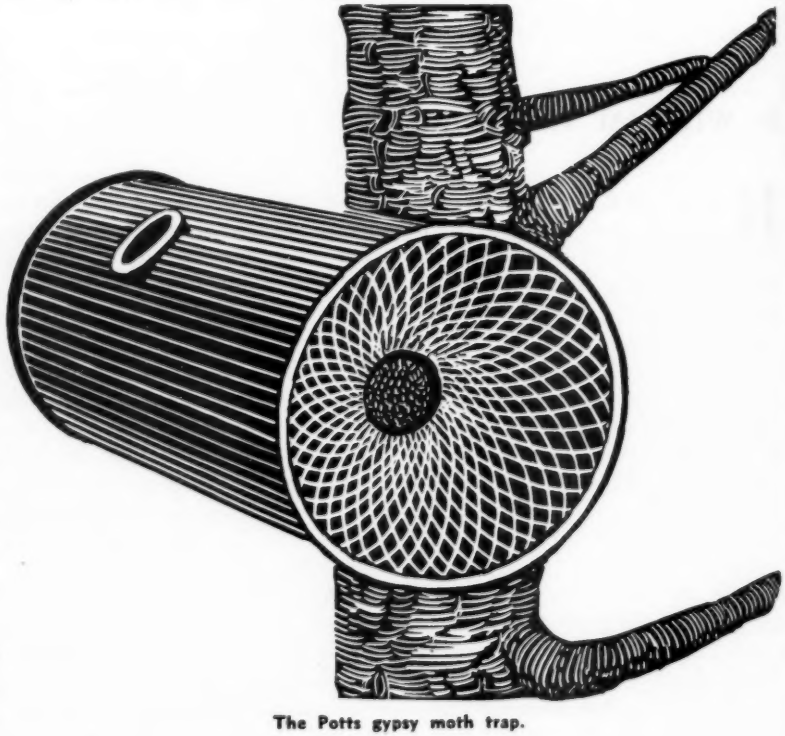
Studies were made to determine whether extracts of virgin female moths could be substituted for the moths themselves. It was considered quite dangerous to have living female moths in uninfested territory even for determining the status of gypsy moth infestation. The danger of accidentally creating additional outbreaks by the use of living material is too great. It was discovered that if the last two abdominal segments of virgin female moths were removed, extracted in a commercial solvent such as benzine, male moths were attracted just as well. When the benzine extract solution was first used the abdominal tips of thirty female moths were used and the solution poured on a cotton wad.

Prior to 1930 assistance was sought from Harvard University to ascertain the chemical nature of the attractant and to produce a synthetic material. Work toward this goal has not been successful as yet.

It was found however, that the longer a female moth was held before clipping her abdominal segments, the more effective was the extract from the abdominal tip. Moths were held in a cool environment and some were clipped every eight hours up to 72 hours after emergence. Since the mortality of the moths increases greatly after 24 hours it was considered impractical to hold moths longer than this period. Tips clipped from dead moths were found to be ineffective.

Field experiments have shown that it is possible to capture male moths with as few as two female abdominal tips per trap, but fifteen tips per trap were necessary to attract the maximum number.

Considerable advancement has been made in the construction of traps since the first Shaw trap. About 1936, S. F. Potts of the Bureau of Entomology and Plant Quarantine developed a cylindrical trap 6.5



The Potts gypsy moth trap.

inches in diameter and 12 inches long. This trap was effective, but was not used extensively because of its high cost of production and its large size, which made it inconvenient to handle in large numbers.

From 1942 to 1948 a very simple trap was used, consisting of a sheet of waxed paper treated with tangle foot as a trapping area. The prepared paper was nailed to the side of a tree. A wad of cotton treated with sex attractant was inserted in an inverted cone of tin or specially treated paper. The cone was attached to the center of the prepared wax paper.

At the end of the 1947 season a new trap was devised patterned somewhat after the Potts trap. This trap, known as the Graham trap, consists of a metal cylinder 4 inches in diameter and 7 inches long with a rim at each end, to which is attached an inverted screen cone with a hole in its center for the entrance of moths. The bait dispenser is suspended inside the cylinder by a wire, both ends of which protrude to the outside and are used to attach the trap to the support. The cylinder is lined with tangle foot treated paper.

The effect of trap color on gypsy moth capture was also studied. Many other insects have shown color partiality in being attracted to objects. The Japanese beetle, for example, is attracted more by yellow than other colors. Preliminary results with the gypsy moth indicate that except for red or white, which seem inferior for attracting purposes, color is of no great importance. Traps painted green, gray, yellow, yellow-orange and orange caught equally well.

Many variations in trap design have been tested, but none seem to be more effective than the cylinder type. It has been found that the tangle foot compound must be combed at least every 10 days to keep the surface sticky. Investigations will be continued to improve this feature of the gypsy moth control work.

During the 1949 trapping season, approximately 7,000,000 acres were surveyed by this method, and about 17,000 Graham traps were used. Since much larger acreages must be surveyed in the future, the value of continuing investigations on this phase of gypsy moth control can readily be seen.

Prevent Quality Loss in Eggs By These Few Simple Practices

PRODUCERS may prevent quality deterioration in eggs by following a few simple practices.

The six principal practices that pay off in hot weather when quality eggs bring good prices, are (1) collecting eggs frequently from the nests, (2) collecting them preferably in wire baskets, (3) cooling them quickly after collecting (4) packing eggs in cases only after cooling, (5) marketing the eggs as frequently as possible, and (6) keeping them moist and cool until they are marketed.

Three or four daily "runs" to collect freshly laid eggs in the hen house are not too many in hot weather. The morning run is the most fruitful because most of the eggs to be produced by any flock in a 24-hour period will be laid in the morning. Noon is another good time to collect eggs so as to get them out of the hen house just before the hottest time of day. A check-up run should be made during midafternoon and the final daily collection in hot weather can be made in connection with choretime in the poultry house.

Poultry experts advise the use of wire baskets in which to collect eggs because these permit the free circulation of air around the eggs during the cooling-off period. Well-ventilated wooden baskets or containers provide a good substitute, but closed baskets, boxes, or other similar containers should never be used.

As soon as eggs are collected they should be placed in a moist room or other location where they will cool quickly. Suitable temperature and moisture conditions are equally important in the maintenance of egg quality. On farms where refrigeration is available there should be no problems encountered in cooling and storing eggs under proper temperature and moisture conditions. Where such facilities are lacking, the coolest possible location should be sought for storage space. Moisture, of course, to maintain as near 85 per cent to 90 per cent relative humidity as possible, should be provided in all rooms or places where eggs are being cooled or stored. In actual practice, the humidity supplied should be just short of that which would cause mold. A spray and fan combination works efficiently to increase the moisture content in dry rooms. Lacking this, producers may hang wet burlap cloths in such rooms with fairly good results.

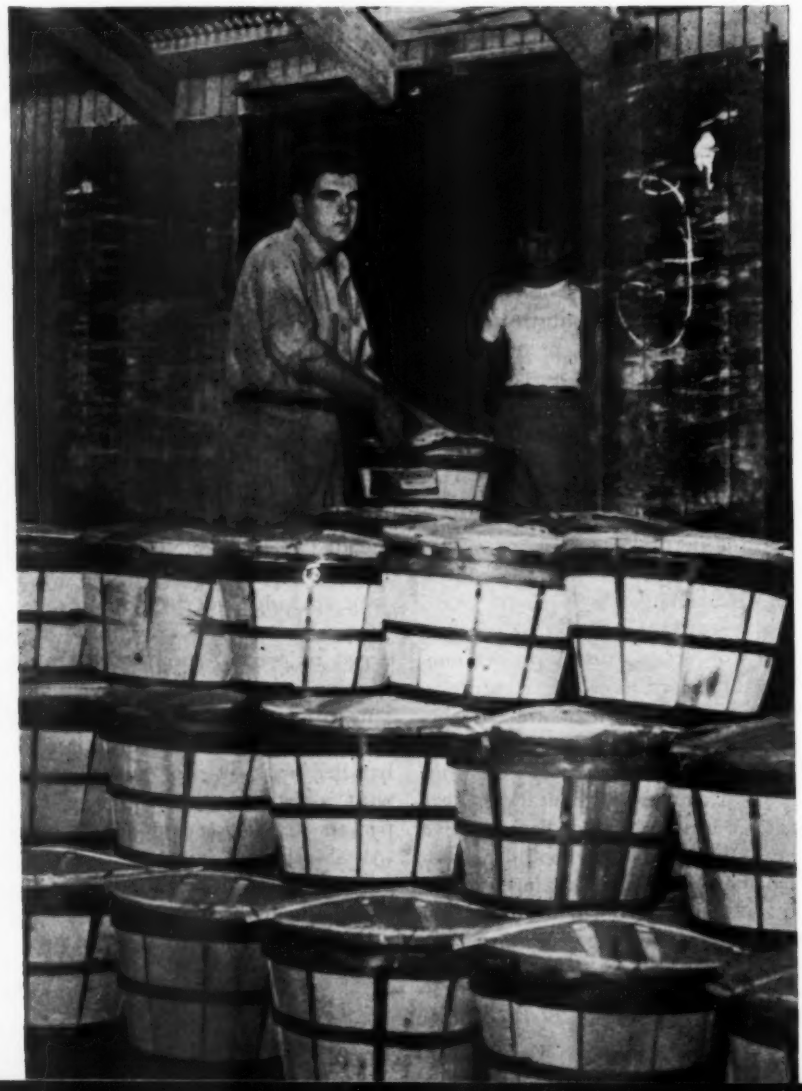
Eggs that are to be kept for hatching should be held at a temperature of about 50 degrees F. Table eggs, to maintain the best in eating quality, should be kept even cooler if possible, and holding them at temperatures of 30 degrees to 32 degrees F., just short of freezing, is recommended if mechanical refrigeration is available.

In packing eggs in cases for delivery to a buyer, producers are urged to precool the egg cases and packing materials, preferably in the same room in which the eggs are stored. Cases and flats or fillers so handled will be cool and charged with moisture when the eggs are packed. If this is not done, the eggs will absorb the heat of the cases and packing materials and the latter will absorb the moisture of the eggs as a blotter takes up ink.

Fruit Storage

Fruit never improves in storage, but good facilities can minimize loss of quality.

By WILLIAM ACKERMAN



PROPER storage is an extremely important factor in regard to quality and keeping of harvested fruits. The main objective of cold storage is to retard the ripening process and thus extend the length of time fruits may be held in good condition. Absence of efficient cold storage facilities would mean a flooded market of fruit at harvest time, but very little fruit would be available during the later winter months and in the spring. Cold storage extends the season when you can buy good firm fruit at your grocery stand.

Cold storage, of course, is no miracle worker; fruit never leaves storage in better condition than when it entered. Since cold storage is rather expensive and only good sound fruit in the proper stage of maturity will stand up in cold storage, it is a good policy for the fruit grower to store only his best produce. Fruit that is bruised or second grade should be disposed of at harvest time. Storage of this fruit will only lead to headaches and trouble.

Important factors affecting the

←

Fruit going into storage. Will it come out in good condition? *Photo by Ewing Galloway*

keeping quality of fruit are the promptness with which fruit is put in storage after harvesting and the temperature, relative humidity and atmospheric gases present in storage.

Since the rate of softening or the ripening process of fruit is largely dependent upon the temperatures at which fruit is kept, delay in storage will cause an overripening of fruit. All varieties of apples have been found to soften very rapidly at warm temperatures. Softening proceeds about twice as fast at 70 degrees F. as at 50 degrees, while at 50 degrees it is almost twice as fast as at 40 degrees which in turn is fully twice as fast as at 32 degrees. Fruit held at 32 degrees will ripen about 25 per cent faster than that held at 30 degrees.

The effect of delays in placing McIntosh apples in storage was studied at the New Hampshire Experiment Station. It was found that a delay of five days in the harvesting, grading, packing, and transportation operations did not materially lower the storage quality, if the fruit was marketed by March 1. However, a delay of 10 days reduced the storage life of the fruit 8 to 10 weeks, and 20 days caused it to become overripe and possess no storage value.

Under storage conditions the commercial life of Bartlett pears was limited to 30 days at a temperature of 43 degrees F.; 60 days at 36 degrees; and 100 days at 31 degrees.

It is rather simple to understand why fruit deteriorates in storage. Fruit is a living organism when it is removed from the tree and continues to carry on metabolic processes. Harvested fruit, of course, does not continue to increase in size, but it does carry on living activity which results in the utilization of the stored substances within the fruit. The speed at which activity takes place is directly dependent upon the temperature at which the fruit is held. The cells of the flesh remain alive until they die from lack of respirable materials, decay, freezing injury, or by other causes. The lower the temperature of the fruit, the slower the life activities within the fruit, unless of course death from freezing takes place.

The effect of temperature upon the ripening process is by far the most important single factor in the storage of fruit. The exact temperature that is optimum for each fruit has been determined by different workers, but there is a lack of agreement. Varieties and kinds of fruits vary somewhat in their temperature requirements. Optimum temperature requirements are complicated somewhat by other environmental factors which play varying roles with different fruits.

The most usual temperature recommended for apples is 31 to 32 degrees F. The temperature at which apples freeze varies with varieties but is always well below 30 degrees F. Naturally, the lower the storage temperature is the more expensive it is to maintain. When it is not desired to keep fruits in storage for the maximum length of time, somewhat higher temperatures than those described may be used. Actually, the problem of disease and physiological disturbances are less at temperatures of 35 to 36 degrees F. than at lower temperatures.

Relative Humidity

Relative Humidity refers to the per cent of saturation of the air with water at any given temperature. When the air contains all the moisture it can hold the relative humidity is 100 per cent. The ability of air to hold moisture is directly proportional to the temperature. That is, the higher the temperature, the more water it can hold. If the temperature of the air is lowered the holding capacity decreases and condensation or "sweating" takes place.

The most practical relative humidity for most fruits is about 85 to 90 per cent. Fruits held in dry atmospheres tend to shrivel and wilt, greatly reducing their value. Too great a humidity favors blue mold and the growth of other fungus organisms.

The most usual tendency of refrigerated storage is to have the humidity too high. A method for correcting this condition is the use of deliquescent substances (compounds that attract or absorb moisture from the air) in containers in the storage room. In common storages the relative humidity is often too low and it becomes necessary to sprinkle the floor; especially is this true if the floor is of concrete. Special spray devices are also used in this respect, and the fruit itself is often sprayed with water.

Gases

Fruit in storage gives off gaseous substances, such as ethylene and volatile esters, the continued presence of which greatly speeds up the ripening processes of the fruit. It is extremely important that a rather free circulation of air, which will prevent the accumulation of these gases, takes place in storage.

Trials have been made for some years on the effect of artificial atmospheres on the storage of fruits. The ripening process of fruits is retarded not only by lowering the temperature, but also by reducing the amount of oxygen. Increases in carbon dioxide in the storage atmosphere reduce the amount of oxygen, thereby decreasing the speed of the ripening process. Oxygen normally comprises approximately 20 per cent of the volume of air in a cold storage room. By use of gas-tight structures and controlled ventilation, the desired proportions of carbon dioxide and oxygen can be maintained. Carbon dioxide accumulates from the respiring fruit in a gas-tight storage. The amount of carbon dioxide may also be increased by the utilization of high-pressure carbon dioxide tanks in conjunction with the cold storage operations.

Allen and Smock conducted experiments in California on the storage of many fruits in atmospheres containing various percentages of carbon dioxide. Northwestern greening apples stored for thirty weeks in five per cent carbon dioxide and 2.5 per cent oxygen at 40 degrees F. were still as green as when first stored and had only a slight amount of mealy breakdown. All fruits were

Fruit Storage

Continued

marketable. Comparable fruit stored in normal air at 40 degrees F. for the same period was completely broken down and worthless.

Common or Air-cooled Storage refers to systems that utilize the natural temperatures of the outside atmosphere to cool fruit in a storage room. Neither ice nor mechanical refrigeration are used, but cooling is dependent upon the intake and circulation of air that is colder than the air within the building. This system can only be used where the naturally occurring temperatures are low enough to greatly check ripening processes. Because of its cheapness and the lack of adequate cold storage near points of production, the common storage method is widely used throughout the Northern states and Canada.

Successful results with common storage systems is dependent upon well-insulated buildings and proper management. During warm weather the building should be kept closed and opened during cool nights so as to pass the maximum of cold air through the building. A common mistake made is to open the storage during warm temperature.

There are several systems commonly used for air-cooled storages. These systems fall into two categories; natural gravity ventilation and forced ventilation.

The Cope system and the Magness system are the best known natural ventilation methods. The Cope system utilizes the principle of providing for the entrance of cold outside air through openings distributed around its walls at the floor level. This air, because of its great weight, replaces the warmer air in storage which in turn is forced out through one or more flues in the ceiling. With the Cope system the fruit in the lower layers cools far more rapidly than the fruit in the top of the stacks. This is a decided disadvantage since when the fruit near the floor is at optimum temperature, the temperature of the top layers is too high.

The Magness system was developed to correct the detrimental effects of air stratification present in the Cope system. The Magness system provides for the intake of cold air at the ceiling level. With air entering only at the room ceiling, the fruit cools at the same rate throughout the storage. The theory of the Magness system is that cold air, being heavy, will find its way through the ventilator openings and drop to the floor of the storage, forcing the lighter air out through the same openings.

Many fruit growers have found it advantageous to combine the Cope and Magness systems thereby obtaining the advantages of both. When the outside air is cold and still, it passes in through the bottom openings, up through the fruit and out the upper vents or the ceiling flues. Whenever the wind is blowing, the cold air enters through the upper vents, passes over the fruit and out the other side.

Forced air circulation may be utilized through the use of power fans that drive the outside air in through vents and blow it through the storage room.

Mechanical Refrigeration

The second type of storage is that of mechanical refrigeration or "cold storage." This type of refrigeration is somewhat limited to commercial concerns and very large growers. It

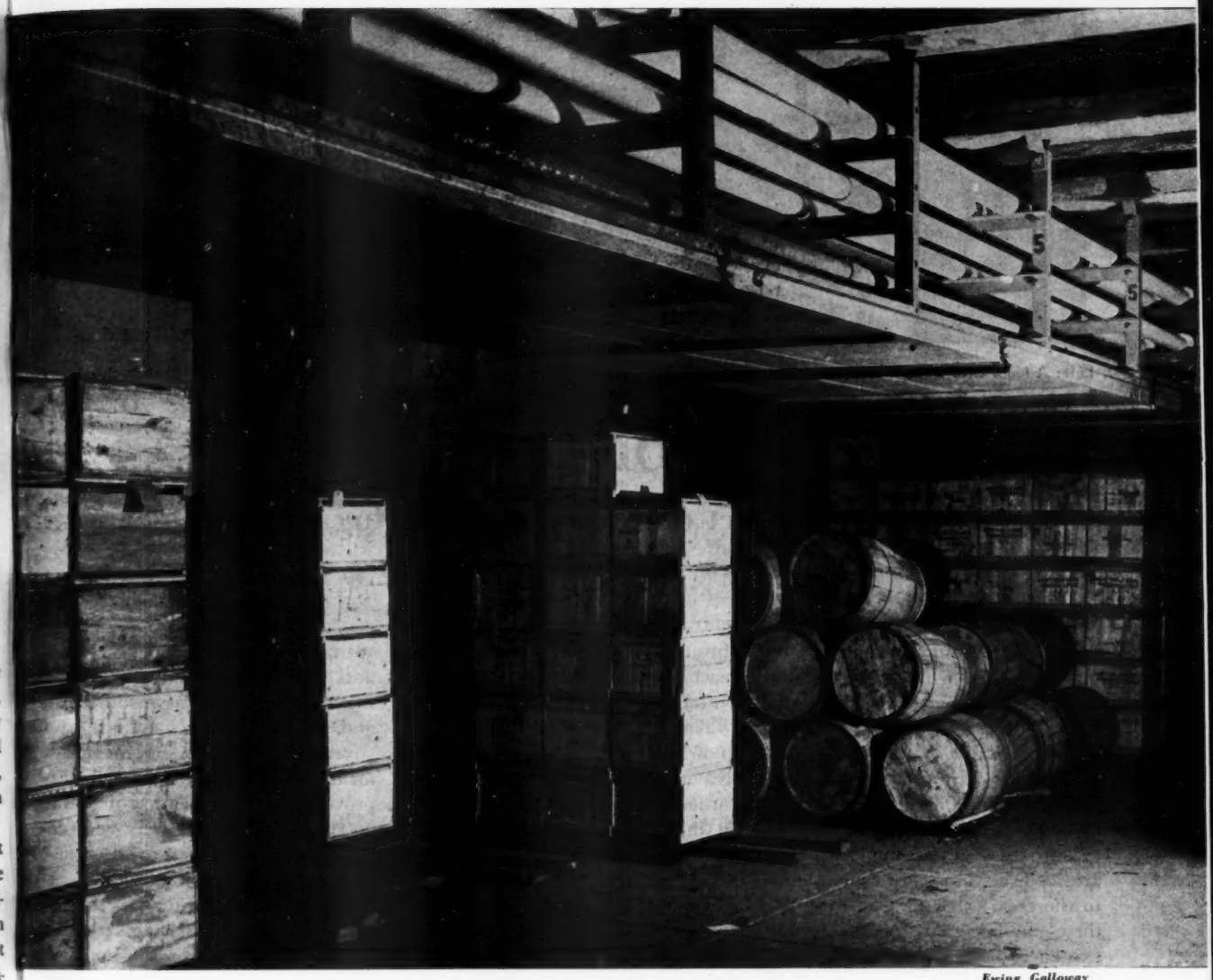
USDA Appraises Wool Situation

THE United States has the resources for a one-third increase in sheep production, and there is a ready demand for the lambs and wool that this added production, would provide. These are the conclusions reached in a report, "Domestic Food Requirements and Sources of Supply," by the Production and Marketing Administration and the Bureau of Agricultural Economics of the U. S. Department of Agriculture, under authority of the Research and Marketing Act.

According to the report, feed and forage resources that can best be utilized for sheep will carry 37 million head. While this would be a substantial increase over the present low numbers of around 27 million head, the sheep industry would continue in a relatively strong position. Domestic wool production would continue to fall far short of meeting total U.S. requirements.

Annual production of wool from this increased number of sheep would total 335 million pounds. In contrast the yearly average consumption of wool during the 1950-54 period is expected to be from 675 to 725 million pounds. This figure would be much larger in the event of increased military needs. Most of the imported wool comes from five countries in the Southern Hemisphere. Because of their distance and resulting transportation required for wool, the importance of domestic wool is much greater during a war emergency.

The report presents a comprehensive economic analysis of the sheep and wool industry in this country, civilian and military wool needs, and the extent to which these needs are supplied by domestic wools, the relative advantages of domestic and imported wools, long-time trends of sheep and wool production and factors affecting them, and the place of sheep in the U. S. agricultural economy and their relationship to the utilization of public lands in the West which are important in sheep raising. Copies of the report may be obtained by writing the Information Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.



Ewing Galloway

An excellent cold fruit storage room in New York.

has generally been agreed that nothing less than a 10,000-bushel crop would justify cold storage on the farm and a 30,000 or 50,000 bushel storage would cost less per bushel than a smaller one.

There are several different types of cold storage refrigerating units. The usual way to maintain mechanical refrigeration has been to install bare pipe coils along the walls or suspend them from the ceiling. Increasing the air circulation over the pipes by a system of fans speeds up the heat exchange from the fruit to the cooling coils. The adaptation of special pipes with fins attached increases the pipe surface area and thus further increases the heat exchange. Such coils with attached fins are known as "flash" coils.

It was found that through the use of "flash" coils and blowers effective cooling could be accomplished by concentrating the cooling pipes into small spaces, providing a considerable reduction in installation costs. Blower fans located in back of the "flash" coils insure a rapid circulation of air throughout the fruit packages in the store room.

Finned coils may be of the dry or wet type. The wet coil is continually bathed with a brine solution which prevents frosting of the coil thus allowing lower storage temperatures to be maintained. It is considered not satisfactory to operate a dry coil cooler at temperatures lower than 33 to 34 degrees F.

Comparisons have been made between the natural coil and the blower systems. It was found that the rate of cooling of fruit was much greater with the blower system than with the coil system. It was also found that there was a greater temperature variation in storage rooms cooled by the coil system. The fruit near the coils or floor were likely to freeze when the center of the room temperature was 30 to 32 degrees F.

Left: A loom with a view. The silhouette of the loom blends into a background of natural beauty. Right: Two of the author's looms.

Fruit of the Loom

Agriculture is the art of Kings, and weaving that of Queens.

By A. I. MacKay

"THEN after Agriculture, the Art of Kings, take the next head of human arts, Weaving – the Art of Queens!" So wrote Ruskin, in *Mystery of Life*, and his words may explain why an article on weaving finds a place in a farming magazine. The basic needs of man, be he primitive savage or atomic scientist, are food, clothing and shelter. It is to the good earth that he turns for these fundamentals of his mortal existence. The soil produces grass and trees, grain and fruit and vegetables. Equally well does the soil produce the raw material for clothing and for man's primitive and not yet outmoded shelter, the tent. Here the weaver becomes necessary to develop the possibilities in the simple products of the husbandman and herdsman.

Primitive culture in all areas of the world developed looms, differing in design but using the same basic principles. The most modern of hand looms is but a streamlined version of the weaving instruments of the ancients, and the visitor to the modern textile mill is surprised, not at the contrast between machine and hand weaving, but at the marked similarity. The mechanism goes through the same motions, but machine power has replaced man power.

The machine age wiped the knowledge and the practice of hand weaving from all but a few remote corners of the slate of civilization. In the United States the southern mountaineers of Kentucky and Tennessee preserved some of the old traditions. In Canada rural Quebec and Nova Scotia carried on. Across the Atlantic the crofters of the Hebrides continued to weave and wear Harris tweeds. Scandinavia was another bastion of hand looms.

Then, early in this century, came the revival of public interest, inspired by the rising tide of protest against the sterility and uniformity of mechanization and mass production. The public began to demand looms and were less than satisfied with the cumbersome antique models available. Craftsmen and then manufacturers began turning out lighter and more efficient models, some, like those illustrated, taking an honored place among fine furniture without impairing their functional value.

Department stores and mail order houses feature looms and weaving yarn, employ hand weaving consultants and sponsor courses. Advertising and other publicity, exhibitions, and committees on standards have government support or encouragement. In some countries weaving has proven a lucrative source of tourist dollars and special government departments are assigned to its promotion.

Technically, weaving may be described as the interlacing, at right angles to each other and in the same plane, of two series of threads or yarns. One series, the longitudinal, is known as the warp, while the lateral or transverse series is called weft or woof or filler. Probably the best known example of simple weaving, familiar to most men but rarely practiced by them, is the process of darning a hole in a sock.

The advantage of loom weaving over darning is that the loom permits all the alternate parallel threads, (half the total), to be respectively raised and lowered, lowered and raised, thus permitting the transverse weft thread to be passed between the whole width of the warp threads in one swift motion, instead of laboriously zig-zagging over and under adjacent threads.

A loom consists of a rigid wooden framework with two transverse rollers, known as beams, fitted one in front and the other at the back. Around the back one, or warp beam, are wound hundreds of parallel warp threads. Sufficient slack is left to permit each thread to be tied to the front roller or cloth beam. However, instead of being directly connected from the warp to the cloth beam, each thread goes through two intermediate guides. The first is a metal eye, known as a heddle, one of hundreds carried by a series of parallel frames, called harnesses. These harnesses vary from two in number in the simplest loom to sixteen or upwards in complex looms; the vast majority of looms in use today have four harnesses. These harnesses may be lowered or raised by a series of levers, either foot or hand operated. This is one of the control mechanisms of the loom, permitting certain threads to be raised while others are lowered, thus providing an angular opening through which the weft thread is passed by means of a shuttle.

The second guide through which each thread passes is the reed, a lateral metal frame comparable to a large comb but with the teeth sealed at top and bottom. Reeds are graduated in various sizes, according to the number of teeth per inch. Actually, it is the slits between the teeth which are the determinant, the slits being known as dents. Warp threads are passed, either singly or in pairs, through the dents. The reed is fixed in a movable frame which permits it to have a horizontal motion, actuated by the hand of the weaver along the line of the warp threads.

A sharp pulling motion, known as beating, presses each weft thread firmly back against the previous one, the aggregate weaving up into cloth. As weaving proceeds and the cloth builds up, the warp beam (which has a cog wheel with rachets) is unwound part of a turn, and the woven cloth wound a corresponding amount on the cloth beam.

Before weaving commences, much preparatory work is needed to set up the loom with the necessary warp. The process is not at all difficult but it does demand meticulous attention to detail. The old-fashioned method, using a warping frame or warping board and requiring the efforts of two people for much of the process, is slow and tedious. However, most weavers being traditionalists, it is still widely used. A modern improvement, called sectional beam warping, cuts this time and manpower in half and does a better job.

The warp is wound on a series of reels held in an upright frame, known as a creel. The reels are assembled in pairs and revolve on metal rods. The threads from these reels are led to a "bottleneck" known as a tension box. Here they pass through two two-inch reeds, separated by a baffle of four wooden pegs, the threads going under and over alternate pegs in order to maintain friction tension. The threads are then tied, in a group of fifty or so, to a tape attached to the warp beam. The warp beam is then rotated, and a two-inch "ribbon" of closely parallel threads wraps itself around the warp beam, within limits enclosed by metal staples. When the required length of warp has been wound, the "ribbon" is cut, the tension box moved over to the next two-inch section, and the process repeated. For suiting material, a 32 or 34 inch wide warp is commonly used, which means that the tension box is moved over sixteen or seventeen sections, on each of which the procedure of the first one is repeated.

The next step is to thread the warp, one yarn at a time, through the eyes of the metal heddles. These eyes are quite large so there is no visual strain, as sometimes happens in threading a needle. Indeed, no normal weaving process imposes eye strain. While one person can thread the heddles efficiently, two make the work lighter, quicker and ensure a check on accuracy.

Threading completed, sleying commences. Sleying is the weaver's term for the process of pulling the warp threads through the dents of the reed. A flat metal hook is used for the purpose. It is common practice to sley two threads through each dent rather than singly, there being good reasons for this. Most warps are made up on a basis of twenty to thirty threads per inch, so a reed having say twenty-four dents to the inch would have its teeth close to-

The shuttle is in the weaver's right hand and her left hand grasps the beater. Harnesses with heddles are behind the beater.

Fruit of the Loom

Continued

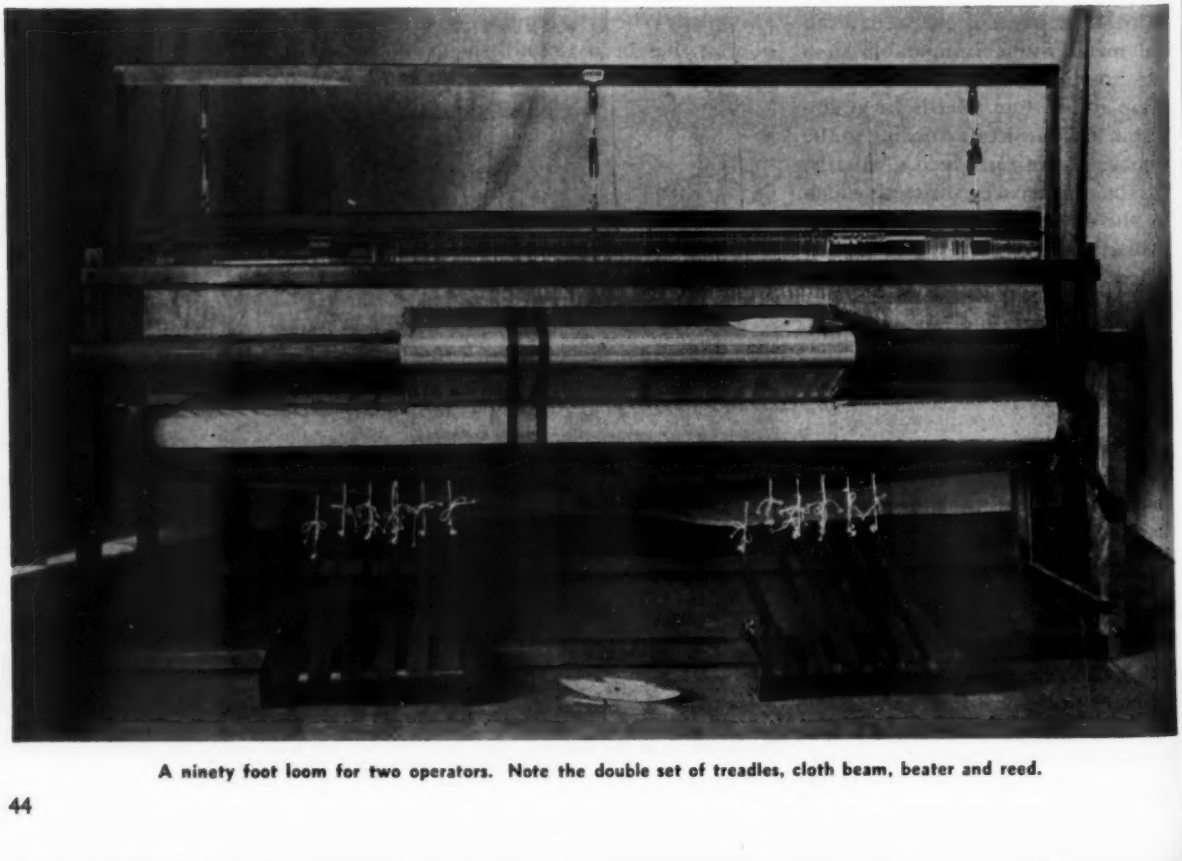
gether, while each metal tooth itself would be thin and easily bent. A twelve-dent reed, on the other hand, has sturdy teeth set wide apart. Another valid reason for double sleying in a wide dented reed is to permit knots or rough spots (which occur even in the best yarn) to slip easily through the dents as the beater moves to and fro.

The final preparatory step is to tie the warp threads, in a group of forty or fifty, to the cloth beam, or rather to a canvas apron attached to the cloth beam. Each group of threads has to be tested against the other groups for evenness of tension. This is a rather slow and delicate process, which may be compared to tuning a piano, except that touch instead of sound is used to determine correctness.

At last the weaver is ready to weave. Warping is finished, so he turns his attention to the weft. No complicated techniques nor equipment are needed here, merely a shuttle, a few bobbins and bobbin winder. The detachable bobbin is loaded with weft yarn, wound in such a manner that it will unwind freely, and it is placed in its groove in the shuttle. Seated at the loom, holding the shuttle lightly in his right hand, he depresses one of the treadles (pedals) attached to one or more harnesses. A V-shaped shed opens in the warp, the nose of the shuttle enters the shed, the shuttle is impelled by a light sharp thrust of the hand and shoots to the far side of the warp, trailing a weft thread behind. The foot is lifted from the depressed treadle, the shed closes, the beater holding the reed is pulled sharply towards the weaver till resistance stops it, and the first weft thread has been woven. Another treadle is depressed, the beater pushed away, and the shuttle thrown through the shed by the left hand to be caught in the right. So the weaving continues.

Nowadays looms may be obtained in a great variety of styles, sizes and prices, ranging from a couple of dollars for the small elementary box loom to $200 or more for the multi-harness professional model. While good weaving of narrow fabrics is possible on a small cheap loom, much greater skill and time is required than on the larger medium-priced models. Anyone wishing a multi-purpose loom, capable of weaving the cloth for a suit or for a necktie, a linen towel or a cotton drape, should be prepared to pay about $100 for a loom. Auxiliary equipment will take about another $50, and a further $50 should be set aside for weaving yarns. On account of limited circulation, textbooks and weaving literature are expensive, but an investment of $10 should cover the needs for the first six months. Additional source books may be borrowed from lending libraries, or by joining a weaver's guild which maintains a technical library.

If you are seriously interested in weaving, you are strongly advised to



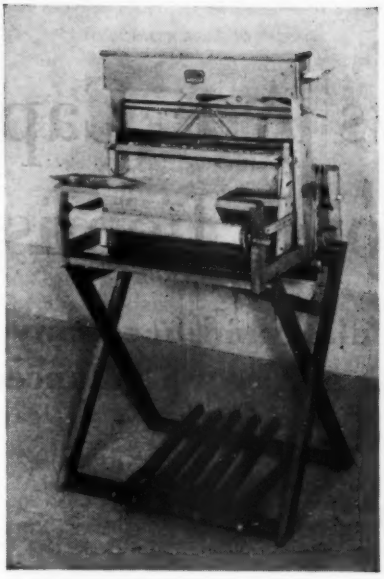
A ninety foot loom for two operators. Note the double set of treadles, cloth beam, beater and reed.

start with a four-harness floor model, having a 36-inch capacity in width of material, and fitted for sectional beam weaving. Some manufacturers now make this type of loom in two models, the standard rigid type and the semi-collapsible folding type, the latter being slightly more expensive. The folding type is advantageous where space is limited or if it is desired to move the loom from one room to another, but insofar as weaving is concerned each performs well.

Beginners sometimes think it a good idea to start with a small table model loom for elementary work, and then graduate to a larger floor model. However, if you have the available floor space (a minimum of 4 by 4 feet and preferable 6 by 8 feet) and the funds, you will make faster and easier progress on a floor model.

Buying a loom is something like buying a correspondence course: lots of people begin with good intentions but give up half way. One reason why so many weavers never get past the dabbling stage is that they start with the wrong kind of loom. All controls on a table loom are hand operated, instead of the combined hand and foot method used on a floor loom. This places the weaver somewhat in the position of a legless man driving a car, and compelled to manipulate the clutch, brake and accelerator by hand as well as the normal steering and gearshift.

Learning to weave is not difficult, but learning to weave well is. There are two handicaps, one psychological, the other technical. Some people claim that the art of weaving is so ancient, so universal and so engrained in man through countless generations of ancestral weavers, that we all have latent weaving instincts. Be that as it may, some people are natural weavers and some seem to be natural fumblers where the loom is concerned. I know of no pre-weaving test, but would hazard a guess that if you drive a car well and enjoy driving, you have the natural co-ordination of hands, feet, and mind, needed in weaving.



A table loom with an auxiliary floor stand. Regular manual controls for operating the harnesses are at the upper right corner.

The technical difficulty lies in the absence of readily available detailed and specific instruction on the art and practice of weaving. To my knowledge, there is no adequate and comprehensive textbook on the market which tells, step by step, what to do and how to do it. Obviously such a textbook would have to be geared to one particular type of loom, for different styles of looms have as many idiosyncracies as different makes of automobiles, even though the basic principle in both is the same. Just as the man who can get the best out of a Ford can quickly adapt himself to the most efficient operation of a Jeep, so the weaver who is adept on a four-harness, counter-balanced loom can readily master the different operation of a ten-harness jack loom. The important thing is to master simple basic weaving; beyond that, progress is easy.

The best way to learn weaving is to take lessons from a weaver who can produce first class weaving of the type which appeals to you, *and who is willing to impart his knowledge.* Not all weavers, including professional teachers, will do this. The closed shop attitude of the old guilds still persists. The fact that someone owns a loom and has made a set of place mats is no criterion of his weaving knowledge. Correspondence schools and textbooks tend to teach you about weaving rather than to teach you weaving. However, perhaps this initiation process is not altogether a bad thing, as it weeds out the halfhearted and also-rans. Really good weavers are few and far between.

Weavers fall into two main groups, groups which may be compared to musicians and artists. The musical type is fascinated by rhythm and harmony, and finds pleasure and purpose in the co-ordination and synchronization of hands, feet, eyes and mind, as yardage of suiting, upholstery or drapery weaves up under a recurring pattern. The artist works more slowly and interruptedly, rhythm, instead of being constant, is frequently broken and changed; the loom is his easel or drawing board on which pattern and design take form, colors blend, and individual threads stand out instead of merging.

Weaving is one of the craft hobbies which can be profitable as well as pleasurable. Expertly woven material finds a ready market, though not a ready-made market. There is a limited but assured demand for hand woven tweeds and finer fabrics. A well tailored suit of good hand-woven wool has a "something" which the most expensive machine product cannot equal. It is the same something which puts a simple but tastefully cooked home meal in a class which a battery of chefs in a high priced restaurant cannot duplicate, the something that the organically grown fruit and vegetables you have raised gives you and which you cannot purchase from the glittering display of the supermarket. And it is a something which stays with you long after the substance of the impersonal product has vanished. The something is indefinable, but unquestionably is compounded in part of the knowledge and skill and pride and love of a fine craftsman towards his product, whether it be the fruit of the tree or the fruit of the loom.

Cows Are Capable Soil Chemists

A cow's palate and her many stomachs are her guide to a balanced diet.

By WILLIAM A. ALBRECHT

From The Guernsey Breeder's Journal

WE ARE coming to realize that the cow, like other animals, is endowed with some uncanny capacities for selecting her feeds. When she selects some plant family, like the clover, and takes it completely, while another, like the broom-sedge, is disregarded to let it grow tall and remain through the winter as proof of its worthlessness as feed, she is demonstrating her capacity as a capable chemist. She is reporting her recognition, not only of the high nutritional values of one plant species in contrast to the low values of the other, but also of the difference in the creative services in terms of feed and food by the soils under these plants. We have been slow to recognize the cow as a chemist analyzing the soil. Her capacity in analyzing what she takes into her body, and in synthesizing what she puts out, deserves our appreciation of her endowment with chemical refinements that science does not yet duplicate.

The Cow was the Soil Chemist Leading the Nomad from one Fertile Soil Area to Another

One needs only to look at history to realize that the survival of the nomad in his primitive agriculture depended on the fact that the cow went ahead of the plow. She was leading the people wherever their agriculture went. She inspected the natural forages, delineated the areas of fertile soils, and marked them out as being fitted to grow food for her owner as well as for herself. Agriculture of the Old World put the plow where the cow had first gone to recommend that it be put there, and has long endured because it sent this capable chemist ahead to scout the areas.

Quite the reverse is the case in our American agriculture. On much of our arable land area, the plow went ahead of the cow. We used no such capable chemist, like the nomad had, to put the stamp of approval on the fertility of the soil as a suitable and enduring food creator for both the cow and ourselves. We are now coming gradually to see that (a) in our problems of protein feed supplements, (b) in the irregularities in conception and (c) in the failures in calving, there are suggestions that the soils may be deficient in items to which we have not yet given sufficient nutritional significance.

Cow's Refusal of Green Grass Marking Her Droppings Suggests Her Recognition of Unbalanced Soil Fertility

It has taken us a long time to learn that when a plant makes bulk, such a performance is not proof that it is making food. The cow has long exhibited her recognition of this great truth. She has regularly refused to take the tall grass marking the spot of her droppings. Yet, she was eating shorter the short grass around it. We were prone to believe her fastidious about getting in contact with her own voidings. But, if we can take a suggestion from some feeding trials with rabbits, she was trying to tell us that too much nitrogen as a fertilizer makes a grass which she, as a nutritionist, cannot approve for her own consumption. She was corroborating what the livery horses told their New England owners, who refused to buy hay fertilized with only Chile salt peter, or sodium nitrate.

In some fertilizer trials on pastures at the Missouri Experiment Station, various fertilizers were used. Where only nitrogen was applied and the tall, luscious, green grass was made into hay for feeding trials with rabbits, they were reluctant to take it except under approach to starvation. Their loss in weight and their discard of the hay from the feed rack, to use it only for bedding, were ample suggestions from the rabbit behavior that the cow's refusal was a vote of agreement with the rabbit as chemist. "Too much nitrogen," both

were saying, with one of them referring to fertilizer and the other to the urine in one spot. Both were capable analysts. But, we had not recognized that as such they were making an unfavorable report on the quality of the feeds, according to the unbalanced fertility of the soils growing them. Here was a case of some experiments that permitted us to learn for ourselves that the cow is a better biochemist and soil chemist than we are.

The Cow now Follows the Plow to Inspect and Guide our Success in Balanced Fertility for Balanced Feeds

Even though we have put the plow ahead of the cow, nevertheless she is now coming along behind it to report how successful we are in fertilizing the soils to grow feeds satisfactory for her. She selects certain pasture areas, given different fertilizer treatments, that are coming to be the guide for many Missouri farmers as to how their soils should be treated. They are using not only laboratory test tubes on the soil to direct their fertilizer practices, but are also asking for the cow's assay of the forages according to her preferred choice of some fertilized areas over others.

Lime has long been used on Missouri soils because the cow, serving as a capable chemist, recommended it by her choice of it as preferred grazing. Now that much of the land has been limed, the treatment of the soil with potash is getting the cow's first choice, more often to tell us of the soil's need for more than only lime. She has been grazing the phosphated soils as first choice for some time, but since this soil treatment adds calcium, sulfur, magnesium, and a host of trace elements, we have thought she was analyzing for phosphorus. She may have been pointing out the effects of the trace elements, and other "contaminants" so common in superphosphate, which we, ourselves, do not yet consider as widespread deficiencies in the feed, much less in the soil growing it. The cow is guiding our fertilizer practices even with respect to the trace elements.

The Cow is More of an Organic Than an Inorganic Chemist

To believe that the cow is a chemist capable enough to be pointing out the single inorganic elements, as we do in burning or "ashing" the forage and making analyses for the separate chemical elements, may be crediting her through an excessive stretch of our imagination. She is probably indicating the presence, not of the separate inorganic or mineral fractions, but rather of organic compounds and complexes synthesized by the help of these mineral agencies coming from the soil.

That these are the probable facts is suggested by tests with hogs that selected, ahead of the corn, the different corn grains from the different compartments of the self-feeder representing plots with different soil treatments. The plots in one series were given increasing combinations of different fertilizers, and grown to sweet clover as a green manure plowed under ahead of the corn. In another series, the same fertilizer treatments were used for sweet clover grown for a seed crop, with corn following the next year. Choices by the hogs of the corn grain, in the latter case, gave the higher percentage consumption according to the amount of fertilizers used on the soils growing it. In the former case, the order of consumption was exactly reversed. Here is the suggestion that the grain consumed is not chosen in direct relation to the inorganic elements of the fertilizers put on the soil ahead of the corn, but apparently according to the different organic compounds in the green manure, or the dead sweet clover residues plowed into the soil ahead of the corn crop.

Perhaps the cow, in her selection of different herbages, is acting like a biochemist searching out food compounds, and is not "ashing" them to determine their inorganic or mineral contents. Perhaps, when so much of her ration commonly consists of carbohydrates or energy foods, she is searching for the proteins to balance them. Since proteins are usually synthesized more bountifully by forages given inorganic fertilizers, like lime and phosphate on our humid soils, we may be erroneously crediting her as an inorganic chemist searching for, and detecting, only minerals. In reality, she should be more properly credited as an organic chemist, or even as a biochemist, balancing her diet according as the higher level of soil fertility has elaborated more protein, vitamins, etc., in the plants, to make this balancing of it possible. Are we not mistaken, then, in trying to help her out by offering her the lime and phosphate as inorganic compounds in the mineral feed box for direct consumption in these forms?

Through her Synthetic Chemistry the Cow Now Makes Her Dung a "Factor" in the Poultry Ration

When the cow is one of the higher life forms, we may well expect a higher number of different elements and compounds to be required to feed her. Equipped as she is to range over extensive territory, she increases her chances to gather from greater soil areas all the requisites from that source. Then, when she daily takes about 150 pounds of green feed into her paunch for the microbial along with the alimentary digestion, she is synthesizing as well as analyzing many compounds. That synthetic performance is the means whereby she can be fed urea and can synthesize it into protein-like compounds to be digested and absorbed farther on in transit through her digestive canal. It is that means whereby she synthesizes several vitamins, hormones, etc., for her own benefit and for the benefits seemingly recognized long ago by hogs and chickens following her, but only recently recog-

nized by the nutritionists. Through this recognition, dried cow dung has now become a recommended ingredient of the poultry ration on behalf of some "factor" still unknown.

Surely the cow that is a collector of all the requisites for these microbial synthetic performances which are serving her, and passing some benefits on to the hogs and chickens following her for her droppings, must be a capable chemist in her own right. She was this long before we even imagined these highly integrated relations of different life forms, including interdependencies between microbes, plants, pigs, chickens and cows. The art of agriculture has long had the farmer's pigs following the fattening steers. This was a practice decades before these relations were recognized by the science of agriculture, that now prescribes dried cow manure in the ration for chickens, but not yet for hogs. Surely, the art of agriculture is old, but the science is new.

As Chemist of the Trace Elements the Cow May Have Known the New Vitamin B_{12} Long Ago

Can it be that the cow, in her range over greater territory and in her support of a greater microbial flora in her rumen, is equipped to gather more completely all the different inorganic elements – including the trace elements – that we, as well as she needs? Can it be that she is better equipped to synthesize them for nutritional use than any other animal? Is this the reason she can be strictly herbivorous, while hogs and poultry must be fed some animal protein supplement?

Such questions present themselves very near to their own answer when cobalt—recognized as an essential trace element for cattle – is a constituent of the recently discovered vitamin B_{12}. Such questions prompt themselves when this new red crystalline vitamin, containing this trace element, is considered the animal protein factor, and the lacto bacillus-lactic factor. Is it too much of a stretch of the imagination to consider additional trace elements, like manganese, zinc, copper and others, playing similarly significant roles in being parts of certain vitamins, enzymes, hormones and other biochemical tools? Might not they be synthesized somehow by the cow and her intestinal microbial flora living in mutual benefit from such chemical elaborations? When these trace elements are required in only such small amounts, and when their omission from certain biochemical processes suggests some disastrous diseases like Bang's, shall we give them less importance and attention because of their presence in only trace amounts? Perhaps the cow has been more of an analyzing and synthesizing chemist than we recognized. Even if we credit her only as a collector, she has guarded against omission of any of an extensive list of elements, some only recently known and possibly others still unknown to us.

Now that we are learning more chemistry from the cow, the problem of feeding her properly takes on more ramifications. Consideration must be given not only to the bulk and simpler chemical composition of her feed, but also to the fertility of the soil growing it. However, the problem need not be considered so baffling when we condescend to learn more chemistry through the help of the cow herself. The feeding of "the dumb brute," as we commonly call her, will be more simple and more successful in terms of service in return from her when we fully profit by the belief that the cow is, after all, a capable chemist in assaying her feeds and the soils that grow them.

Incidence of Cavities Related to Health of Soil

By Arthur A. Blake, L.D.S.*

MUCH has been studied and written about the relationship of nutrition to human diseases of all kinds. But too little attention has been paid to the importance of having food that comes from healthy soil that is nourished by natural fertilizers.

The missing element in soil that is ravaged by erosion and artificially kept producing by chemical fertilizers is humus. If we believe in the cycle that nature has established of life, growth, death and decay, then life again, we must return the animal and vegetable wastes to the soil. They, in turn, supply life and fertility and we must supply calcium and phosphorus in adequate amounts.

Figures from the Royal Commercial Traveller's Schools show that in 1939: 50 per cent of the children had 0-2 cavities; 32 per cent had 3-5 cavities; and 18 per cent had 6 or more cavities. In 1941: 56 per cent of the children had 0-2 cavities; 27 per cent had 3-5 cavities; and 17 per cent had 6 or more cavities.

A new head gardener arrived in 1941 and the school became self supporting, growing its own food and using only organic methods. Pigs and chickens supplied animal waste. Even clippings from the playing fields supplied some of the green stuff.

We now have the figures for 1949. In fact, the figures from 1945 to 1949 are amazingly consistent. Among the boys, 99.19 per cent had 0-2 cavities, among the girls it was 97.5 per cent with 0-2 cavities; 0.81 per cent of the boys and 2.5 per cent of the girls had 3-5 cavities, and not one child had 6 or more cavities.

No change has taken place other than that in the school gardens. We have been told of a relationship between nutrition and tooth structure. But I humbly suggest that healthy food from healthy soil must become an additional control.

* BLAKE, A.A., Healthy Soil and its Relation to Dental Caries, *The Dental Record*, 70/2:55-60, February, 1950.

From the *Dental World*, Third Quarter, 1950.

Miscellany

THE other day I went to see an irrigation installation in the Lehigh Valley of Pennsylvania, not far from the experimental farm of this magazine. The entire installation represented a cost of about $8000. To this figure must be added the cost of maintenance and repairs as well as the cost of fuel used to pump the water from the creek which abuts the farm.

The need for such a large expense shows the ultimate effect on the soil of the use of chemical fertilizers. Chemicalized soil becomes so hardened that the rains will not penetrate and resort must be made to large investments of money.

This particular potato farm, of only 125 acres, began the use of overhead irrigation last summer, in the middle of the season. As a result of inexperienced use of the equipment, the potatoes became lumpy and had to be sold at much less than market price. Here we are in an area that has as much as 55 inches of rain a year and this farm is starving for water. Why? Because the soil has little absorbent quality due to a lack of organic matter.

We have had quite a dry spell recently and after many weeks of such weather it suddenly began to rain.

A local farmer said to me, "This rain is no good."

"Why?" I asked.

"Because it's raining too hard. The rain is not going into my land. It is going into the ditches," answered the farmer.

"That's too bad," I replied. "On our farm the rain is going into our soil, because we have so much organic matter in it."

That farmer is particular. He wants a gentle rain. We on our organic farm do not have to be so particular. We will take any old kind of rain, and if there gives no rain, as the Dutchmen around here would say, then that is all right with us too, for our organic soil has stored and is holding plenty of water for just such an emergency. But the potato farm which has had to install irrigation or go out of business is confronted with a soil that becomes as hard as concrete when it does not rain.

I would have taken that $8000 spent for irrigation and done differently. First of all I would have purchased a good used dump truck for about $1,500. I would then have invested the rest of the money in hiring a man whose sole task would be to operate that truck and survey nearby sources of free organic matter. He could spend his entire time hauling hundreds of tons of free organic matter such as corn cobs, spoiled hay, weed cuttings, etc. He could apply this matter directly to part of the farm that is being fallowed or rested for this purpose.

It is not uneconomical to rest as much as 25 per cent of a farm. I know of farmers who are doing it and raising their yields on the rest of the farm to more than compensate for it. After ten years or so of such fallowing the organic matter of the farm would increase to such an extent that the fallowed acreage could be reduced to 15 per cent and after another ten years to a permanent basis of only 5 or 10 per cent.

The trouble with this potato farm is that it is using chemical fertilizer and a lot of it, which is destroying the structure of the soil. If he would follow the organic method he could get a premium for his potatoes and not have to do one-fifth of the spraying which he now has to do because of the disease and insect infestations which are a part of chemical farming.

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Miscellany

Continued

Farm Ponds

As a part of this conservation tour we saw several man-made farm ponds. The ponds were placed close to the farm and the house and provide water in case of fire. It furnishes fish for eating and a place for swimming. In some situations it can be placed to receive rampaging rain water.

These ponds are hopelessly chemicalized. They must continue to use the poisonous copper sulphate to kill the algae which accumulates on the surface water. They are told also to use a chemical fertilizer. I maintain that both the copper sulphate and the chemical fertilizer affect the fish and make them dangerous for eating purposes.

In the water supply pond of the city of Ridgefield, Connecticut, a few years ago they recognized the dangers of using poisons to control the algae and they stopped it. Instead they overstocked it with fish. At the last time I wrote them a few months ago, the method was still working and the algae condition was being held in check. Experimental work is needed in running these ponds on an organic basis. Will a few readers of this magazine undertake it?

Contour Farming

I cannot recommend this practice too highly. Wherever a farmer has land which rolls too ambitiously this method should be used and the conservation department of your region will be glad to lay it out for you without any expense to you. Between the organic method on our farm and contour-strip farming we do not lose as much as a thimbleful of water from our place. It is very comforting to know that your land has an anchor. We recently took a tour of local farms arranged by the local Soil Conservation Service Branch and it was an extremely instructive day. We saw various applications of it for all kinds of crops seeing even a vineyard planted on the contour on a steep hill, with diversion terraces to hold the rains in decent channels.

The Government man told an interesting story about a section of the State Game Lands that we visited which contained lands that it desired to rent to neighboring farmers. But it made one condition. If they wanted to farm the land they must guarantee in advance that they would contour farm it, for the land was very steep and hilly. The farmers who had the same kind of land on their own farms refused to accept it on that basis. O. K., said the Game Lands men. No strippee no farmee. A few years went by. The farmers looked longingly on the practically virgin land that they were not availing themselves of and their mouths drooled. Finally they swallowed their pride and agreed to farm the land on the terms of the conservationists.

And then what happened? After a few years of strip cropping these farmers saw that it gave better results and they finally adopted the method on their own acreage. It reduced soil erosion and actually increased crop yields.

Stone Fences

On the conservation tour we were shown a place where three fields had to be converted into one. The point to be solved was how to handle the huge amount of stone in the fencerows. The way it was done was as follows: The farmer plowed as deep a furrow as he could, parallel to the fence, and when he had done as much as he could a contractor was called in who had special digging equipment and who dug the furrow deep enough so that all the stone could be thrown in. The top of the stone was low enough in the ground that it did not interfere with plowing and cultivating tools. It had worked out beautifully.

There could have been a better way of doing it though. The Greundler Company of St. Louis makes a

stone grinding machine that sells for about $1,000 which could have been used to grind up the stone fence and the resultant powder could have been strewn over the fields as a fertilizer. Over a few years the particles of rock-dust would have become available for the needs of the crops, especially for trace mineral elements. Practically all rocks possess some trace minerals.

There is another machine that could have been used in this situation which is called a stone exploder but which is more expensive than the grinder mentioned above. This one is made by the Lukens Steel Company and sells for over $2,000. This machine is made to go into a field that contains much small rock. As it moves through the field it gathers in the upper seven or eight inches of soil, explodes all the rock that is in it to a fine powder, and strews it back on the field in its wake.

I saw one of them working recently. The Lukens Company has made only 25 machines and they are out at present on an experimental basis to iron out their wrinkles. This machine can also be used on a stationary basis—that is it can digest whole fences of rock by merely having it thrown into the machine. I have been told that it also does a wonderful job of grinding up to a fine powder any organic matter such as corn cobs, leaves, weeds etc.

An expensive machine like this could be owned by the Federal Government, let us say in each conservation district, and sent around wherever there is a need for it. The small farmer could never afford to have one of his own. There are rocks and rock deposits all over the country which contain valuable fertilizer elements. We must not only confine ourselves to phosphate or potash rocks or to lime. There are other ingredients in rocks which the soil is badly in need of, such as trace mineral elements, which are also contained in phosphate and potash rocks as well as in limestone. But some of these have to come from long distances, whereas right under the farmer's nose there might be rich deposits of rock which can be had very cheaply.

The subject of rock fertilizers must be thoroughly investigated by Congress in connection with the committee it recently set up to investigate chemical fertilizers. To my mind it is the greatest blunder of agricultural science of the last fifty years that it has overlooked the use of rocks as a fertilizer. The Connecticut Agricultural Experiment Station at New Haven, Connecticut has made a fine beginning by experimenting over a three year period in growing tobacco with potash rock in comparison with chemical fertilizer forms of potash. They found some advantages in using the rock product, besides a slightly increased yield.

Corn Cobs

On one of the farms we visited on this tour we were standing in the field while the conservationist was describing some terraces. Behind him, broadcast on a pasture crop, could be seen some ground-up, fresh corn cobs.

"Tell them about what this farmer is doing with those corn cobs," I suggested, and he told them, indicating also a large heap of sewage sludge which the farmer had obtained free of charge and was weathering before applying. This farmer happens to be a reader of our magazines of many years standing and has become organic matter conscious.

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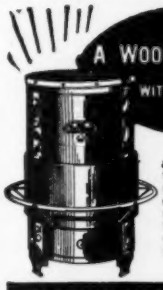

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Memos To Farmers

A Correction

An article written by me entitled "Compost Goes Commercial" appeared in the Fall issue of *The Farm Quarterly*, a colorful periodical with orthodox views on chemicals in agriculture.

In self-defense, I want to explain that at least one statement in that article was not written by me and is not representative of my beliefs. Here is the sentence I am referring to:

"But if soils are low in nitrogen, phosphorus and potash, compost alone cannot supply it, unless applied in quantities often prohibitive for the average farm."

Hundreds, perhaps even thousands, of organic farmers have proved that that statement is not true. They have taken compost, made either in heaps or right on the field, and restored a worn-out farm to productivity and made money in the process.

Most people don't realize that when a farm is depleted and refuses to grow crops properly it is usually suffering from a dearth of *available* nutrients only. It has been shown that a soil may produce crops deficient in phosphorus and still have enough unavailable phosphorus in reserve to last 60,000 years.

Compost — or any organic matter — acts to release unavailable nutrients as a result of its decaying action. Even trace element deficiencies are usually corrected by the application of organic matter. So, you can readily see that organic matter is worth a lot more than a chemical analysis of it would indicate.

Real Push Button Feeding

Engineers at West Virginia University are using coal moving techniques to move grain on the farm. A pipe of only one inch diameter is used to transport wheat or other feed grains at the rate of one ton an hour.

The grain is "fluidized" by being "mixed" with one pound of air per twenty pounds of grain. It then can easily be forced through the small pipe for reasonable distances.

Air fluidization is a principle that has long been used to move powdered coal and other fine materials. Very little powder is required. The power required by the air compressor used to move the grain in the West Virginia tests was less than three-eighths of one horsepower.

Spend Time to Store Vegetables Well

Proper vegetable storage can mean summertime enjoyment of fresh vegetables through the early and middle winter months. The Colorado A & M College Extension Service has come up with a good outline of storage procedure which is given here:

Ideal storage is thermostatically controlled and artificially refrigerated. However, homes without sufficient artificial refrigeration may use unoccupied spaces in the garage, basement or porch. Most of the garden fruits and vegetables which can be stored require a storage with temperatures slightly above freezing and with high humidity. These vegetables are the root crops, carrots, turnips, beets and a few parsnips.

In the same storage, potatoes and apples, depending upon variety, may be kept from three to five months. Pumpkins, squashes and sweet potatoes must be stored at higher temperatures and under drier conditions. Onions require dry, cold storage.

Without mechanical refrigeration, any unoccupied space may be used as long as that space may be insulated and the humidity controlled. Ventilators into the room can be arranged to remove the warm air of the day and draw in cold air by night.

Humidity can be maintained in a number of ways. Where the humidity is not maintained the vegetables will shrink and shrivel.

In the storage room saturated peat moss may be spread on the floors or wet burlap sacks may be spread over the box of vegetables.

Root crops including potatoes can be stored in moist sand if that sand is kept moist or in air-tight, moisture-proof containers at a near freezing temperature. Root crops, cabbage, potatoes and apples can be stored in the garden in pits or mounds if late in the season. This must be done after the soil temperatures go down. When put in pits or mounds they will provide their own humidity but if temperatures are not down a vent must be provided.

Guard Against Weevils

Many organic farmers use their own grain for seed year after year in order to take advantage of the increased vitality that organic methods give it. However, if you are not careful, weevils boring through your fresh grain can cut your yields severely, because weevil infested kernels will not sprout.

Grain to be used for seed should be artificially dried if it has a moisture content greater than 12 per cent. Dry grain is much more resistant to weevil attack. It is also a good practice to clean out grain storage places thoroughly before bringing in a fresh crop. Keep new grain effectively separated from old grain that may have weevils in it.

Much Winter Wheat Lost in North Dakota

Only 10 to 20 per cent of North Dakota's winter wheat crop this year was strong enough to be harvested. The rest succumbed to winter killing and flooding. The little wheat that did survive did so because of exceptionally heavy snow cover. Windbreaks, which keep more snow on the field, help in cases like this.

R. B. Widdifield, of the North Dakota experiment station, says that winter wheat varieties available for use in North Dakota are at least partly at fault. They are not sufficiently winter hardy to stand severe winters. Widdifield says that winter wheat is occasionally a profitable crop in North Dakota, but that experience over the past 40 years indicates that it cannot be recommended as a dependable crop for that state.

Why Mexico Has Poor Land

Many people, myself among them, have wondered how it was possible for a nation to have such fantastically poor soil as Mexico. In many a field the soil is so hard that it can not be crumbled with the fingers.

A professor of physiology, Dr. Sherbourne F. Cook of the University of California, has recently concluded a study of Mexico and concludes that her civilization is from 3,000 to 5,000 years old. Previously, no one had thought that agricultural societies existed until about 2,000 years ago. Dr. Cook feels that the primitive Mexican population was so large and cultivation so intense that erosion had brought the land to ruin long before the white man arrived. Actually, therefore, the present Mexican civilization had no fertile soil to start with.

ROBERT RODALE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233)

Of The ORGANIC FARMER published monthly at Emmaus, Pennsylvania for October, 1950.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—J. I. Rodale, Rt. 2, Allentown, Pa.

Editor—J. I. Rodale, Rt. 2, Allentown, Pa.

Managing Editor—Robert Rodale, Rt. 2, Allentown, Pa.

Business Manager—J. I. Rodale, Rt. 2, Allentown, Pa.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address as well as that of each individual member, must be given.)

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Signed, J. I. Rodale, Publisher

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If you are preparing to do some Fall sowing, ACTUMUS powder mixed with the seeds will improve growth. Moderate quantities of ACTUMUS mixed with fine sawdust spread over the land and disked in before sowing will promote strong, healthy growth. This can be done to condition soil for Spring sowing and planting. Excellent for orchards. If you are a farmer, truck gardener or commercial grower write us for details of your particular problems. DO NOT POSTPONE writing NOW for information and prices. Make a trial and convince yourself, so that you can start reaping the benefits early.

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Books

Reaching the Farmer

MAYBE the increasing complexity of farming is a factor, but whatever the cause, not many will doubt that the American book publishers are missing the boat as far as the practical, hard-knuckled farmer is concerned.

The American farmer needs books. He needs them most of all for the information and relaxation they can give him. But he also needs them to answer the questions that are always in his mind.

We are just now receiving the first replies to a questionnaire sent to 2000 *Organic Farmer* readers about a week ago (to be discussed at length next month). The answers to that questionnaire leave no doubt that our readers – and all farmers – are as inquisitive-minded and hungry for knowledge as any social group.

Unfortunately, the average book on farming doesn't reach out to the outlying districts. It gets as far as the agricultural colleges, and there its effectiveness and its mission ends.

"Tell me more about grass!" asked a large block who answered our questionnaire. You wanted to know everything about green manure crops, cover crops, hay crops, pasture crops – any kind of sod crops.

The D. Van Nostrand Company evidently suspected that there was demand for information on grass, for they have just published a big fat book entitled *Forage and Pasture Crops.*

Now, that's anticipating the needs and desires of the farmer, you say. I guess you're right, but when I look at the $8.00 price tag on this book and its 750 humorless and footnoted pages, I can't help thinking that it's not going to get to the man who really needs it – the practicing farmer.

Forage and Pasture Crops is essentially a good book. It will probably answer all your questions about grasses and it doesn't ramble on in the gobbledygook of science and the technical writers. Its author, W. A. Wheeler, is not above writing a simple sentence like, "Pasture renovation means the improvement of any type of pasture." You'll find in it a description of every grass from Hairy Grama to Turkestan Bluestem, with complete directions for their use. Even haymaking and silage making are treated in detail.

But it lacks that something that will make a farmer in Waterproof, Louisiana go out and buy a copy. Perhaps it's the Waterproof farmer's fault and he doesn't know what's good for him, but I can't help thinking about the human and intriguing things Bob Seeds, whose own writings are on page 20, would have written about grass. R. R.

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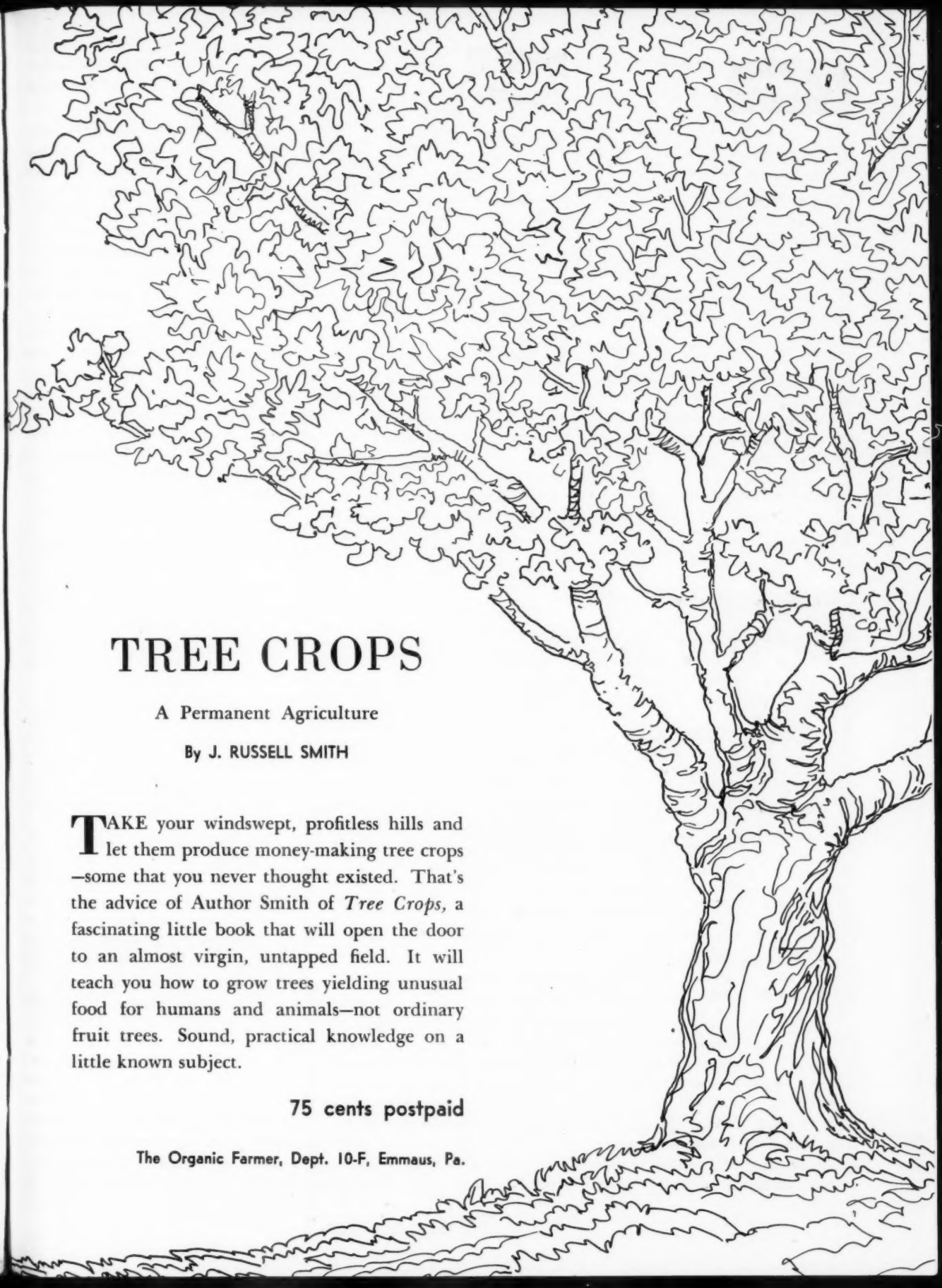

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Poultry

House Pullets Before Cold Weather Sets In

September is the month to get your pullet flock into the laying house before cold weather starts.

Pullets in the trees mean empty egg cases and no profit in the poultry business.

September is also a good time to start a quality egg program. Produce good eggs by gathering often, culling out the poor ones, packing in cases large end of egg up, and then get them to market at least twice a week.

And, any time is the right time rid of the fat pullet that lays no eggs. It pays to cull out the nonlayers the year around.

Built-Up Litter Lowers Egg Costs

In establishing built-up litter in the laying house the poultryman is lowering his production costs and taking a step toward cleaner eggs. Among litter management practices outlined by John C. Taylor, extension poultry specialist at the College of Agriculture, Rutgers University, are these:

1. Make deep litter. Start with 4 to 6 inches of new litter, and as this is broken up, add more until it is 10 to 12 inches deep. This provides the volume needed to absorb dampness and fresh droppings without becoming caked. It also promotes chemical and biological actions that develop better built-up litter.

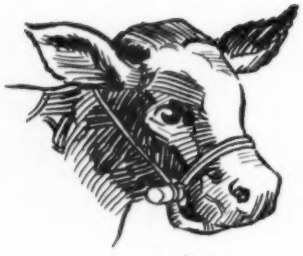
2. Stir litter to keep it absorbent. Stirring mixes fresh droppings and caked material with the finer decomposed litter material at the bottom.

3. Ventilate the house properly to eliminate excess moisture. Too much moisture can bring on problems of damp, soggy, wet litter.

Warmth is needed to facilitate the chemical and biological actions in built-up litter, Taylor explains, but no special attention need be given to this factor. If the inside temperature of the house in winter is 10 to 15 degrees above the outside temperature, the litter may gather some excess moisture.

Each year enough litter is taken out to leave a foundation of 6 to 8 inches of fine material. This means less labor is required in removal and replacement of litter. A good time to start built-up litter is with the housing of new pullets, Taylor adds.

Livestock



A Simple Bloat Cure

By Benjamin Manz

A neighbor cured one of our calves that was bloated this spring in as simple a method as I have ever seen. All he did was tie a stick in the calf's mouth as shown in the drawing. The calf started chewing almost immediately and after a while began burping. The value in this seems to lie in the fact that it opens the calf's mouth. At any rate the calf soon got over it.

If you wish to try it, all you need is some twine and a piece of broomstick 6 or 8 inches long. Cut a notch around the stick close to each end so the string will stay on. In a few hours, or after the swelling goes down, the stick should be removed to prevent injury to the mouth.

Of course if this did not work it would pay to call the veterinarian, but it seems to me this simple device would be safer to use than dangerous "home remedy" medicines.

"Outside" Manure

By Benjamin Manz

Every organic farmer is aware of the great value of manure, it being superior even to rock fertilizers. The practice of getting manure from sources outside the farm is to be recommended, but unless certain precautions are taken serious trouble may result. All manure contains large amounts of bacteria, most of which are beneficial. Quite often disease germs are mingled with these, though, and parasites are also commonly present. In view of these facts the livestock farmer should exercise extreme care in the use of outside manure. The best treatment would be to spread it on land just after it has been in pasture or hay, ahead of the grain crops. If any land is used for chemurgic crops this would be the place for it. Of course, if you have no livestock these precautions are unnecessary.

While a manure spreader is not indispensable, it saves a lot of work and tests on an Indiana farm, as reported by John Deere, show that machine spread manure gave bigger yields than hand spread manure, due, no doubt, to better distribution in the soil. For any amount of road work the rubber tired spreader is worth the extra cost.

Besides other farms, check these sources for free manure: fairgrounds, stockyards, race barns and poultry establishments. Small slaughter houses where less efficient use is made of by-products might also provide the ambitious farmer with fertilizer.

Animal Carcasses Are Source of Bang's Disease

The germs that cause brucellosis, or Bang's disease, can survive in hog carcasses for at least three weeks, says a research paper of the American Veterinary Medical Association, according to Delmar J. Young, extension dairyman at the University of Delaware. Brucellosis has always been a common and dangerous disease in cattle.

In a paper presented to the American Veterinary Medical Association's national convention, research workers said that they were able to isolate brucellosis germs in more than 78 per cent of the infected hogs that were slaughtered.

Brucellosis, sometimes called undulant fever in man, has long been known as an occupational hazard for veterinarians, livestock raisers, packing house workers, and people who drink unpasteurized milk from infected cattle.

Mr. Young says that this study emphasizes the danger to human health from handling infected hog and cattle carcasses, either in packing plants or on farms where people butcher their own meat. The disease is painful and protracted in man, and causes thousands of dollars worth of loss in animals yearly. See your county agent, or extension workers for information on controlling and eliminating brucellosis, says Mr. Young.

Homemade sideboards like these increase the capacity of a manure spreader for light strawy manure, save time when hauling a distance. Useful for sheet composting other material, too. Keep one sideboard on all the time and use it as a "bang" board.

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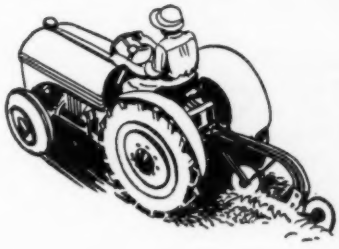

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"My subject," says the author, "is food, which concerns everyone; it is health, which concerns everyone; it is the soil, which concerns everyone — even if he does not realize it — and it is the history of certain recent scientific research linking these three vital subjects."

Agriculture the Prime Social Service

Lady Balfour stresses the necessity of clarifying the connection that exists between "biological soil activity and health." "If the nation's health depends on the way its food is grown," she writes, "then agriculture must be looked upon as one of the health services, in fact the primary health service . . . The greatest social service of them all is, or should be, the provision of the people's food."

The book is packed with such striking data as the experiment demonstrating how cellulose left for a year in virgin soil underwent virtually 100% decomposition when the soil had been treated with compost, whereas in another plot the addition of artificial fertilizers impeded decomposition more than 50%.

Lady Balfour's work — both as a practical farmer and as a keen student of soil research in many lands — has made her name known throughout the world. *The Living Soil,* fascinating to read, is a foundation stone for an agricultural library, a book needed by every farmer — in fact, by anyone who is really interested in learning more about his soil and what makes it work.

Order your copy today! 270 pages; 38 photographs. **$4.00**

THE ORGANIC FARMER

Dept. 10-F **Emmaus, Penna.**

A Nurseryman Goes Organic

By GERTRUDE SPRINGER

FOR the August meeting of our Organic Gardening Club, we drove to the Sunshine Valley Nursery at Nashville, Michigan, to learn how Mr. and Mrs. N. Barger, owners, had built up the valley from worthless blowsand to its present state of high fertility by the use of organic methods.

A $2 gift of perennials from Mr. Barger to his wife was the humble beginning of this project, which is now valued at $35,000. The special attraction to the club was Mr. Barger's statement that he built up the blowsand in two seasons. We were anxious to learn the secret.

"My method of soilbuilding is effective, easy and cheap," said Mr. Barger in answer to our questions. The secret is soybeans. When we bought that 70 acres for $600, the crop of rye on it was too poor to harvest. I seeded it to soybeans and got part of a catch, which was plowed under and replanted to soybeans the next year. This was a good crop and I plowed it under and began my nursery, for I had the necessary humus in my land to produce a crop. I use barnyard manure, which my neighbors give me for hauling it away. They prefer commercial fertilizers because they are easier to apply. I draw in sawdust and turn under my weeds. I always have a piece of my land planted to soybeans for turning under, and every row of nursery stock gets some organic matter each year."

Mr. Barger went on to say that he inoculated the soybean seed before planting, and that he found large nodules of nitrogen on the roots. "These nodules are Nature's way of adding nitrogen to the soil. The plants get it from the sun. This quick way of soilbuilding is one that the poorest farmer can manage. I use mammoth clover and sweet clover as well as soybeans, and I often add oats or rye to the bean seed."

The patch undergoing the soybean treatment this year had a nurse crop of oats. Mr. Barger advises any farmer to put aside a portion of his land each year for rebuilding, planting either soybeans or cheap clover to turn under without harvesting. The next year, rebuild another spot, and keep this practice up indefinitely, he declared, and his beautifully kept grounds and nursery stock bear out his statement that you can build up the most worthless land in two or three years with this method. Five or six years of such treatment and you have soil of high fertility and productivity. He practices shallow plowing with the moldboard plow, with the furrow turned at a 45-degree angle for best bacterial action during the decomposition process.

Although this valley soil is still light and easy to work, we were amazed at the amount of moisture immediately under the loose surface layer, for we were going through a dry spell. Mr. Barger told us how he preserves the moisture without any irrigation whatever.

"After each rain as soon as we can get to the ground, we cultivate our nursery stock with the garden tractor with specially constructed teeth." He uses a Bolens Tractor which has adjustments for all kinds of teeth, and Mr. Barger had these cultivator teeth placed so that they laid horizontal with the surface and about two inches below. They cut the weeds below the surface, but

their main work is to lay a dust mulch, which acts as insulation. "We leave this mulch strictly alone until the next rain, when the process is repeated. This way, we have a good insulating mulch over our land all summer and we have all the moisture we need regardless of the droughts when our neighbor's fields are burned to a crisp," says Mr. Barger.

We scraped the shallow dust mulch in many places on the large nursery tract and found the mulch and moisture tables uniform proving that our host knew what he was doing. We could see from the crops that the soil on the adjoining farms is almost worthless. Mr. Barger's land is rich and fertile and growing better each year, in spite of the large amount of nursery stock and seeds that are shipped to 37 states off the land.

"When we bought this 70 acres," said Mr. Barger, "every time the wind blew, this sand raised until we couldn't see the woods behind it."

"Does this dust mulch ever blow?" asked the president of our club.

"No," stated Mr. Barger. "It is filled with humus and organic matter and it stays on the ground regardless of the strength of the wind."

The Bargers' consider that the best results from their organic practices is the difference in Mrs. Barger's health. When the Bargers' bought this land, she suffered from pernicious anemia to the point where her life was in danger. Without expensive modern treatments, she has improved until she now carries a program that would floor an ordinary person. Besides assisting in all phases of the nursery work, packaging, corresponding and filling seed orders, she takes slides of their methods of soilbuilding and shows them, along with hour and a half lectures, to Granges, Farm Bureaus and church meetings.

Mr. Barger attributes this great change in his wife's health to the naturally-grown vegetables and small fruits and to their plentiful supply of wild game in season. These game birds feed on the patches of soy beans which Mr. Barger never harvests, but which he turns under to replenish the soil each year.

With the Editor

(*Continued on page 9*)

professions such as agriculture and medicine entertain for the vague, hidden powers of big business, encouraging them to leave them alone, so to speak? I do not know.

The sad part of it all is that practically all of us are ruled by money. If the presidents and the vice-presidents of big business could only be satisfied with less money and substitute instead the knowledge that they are serving mankind! The big fertilizer interests could go into the manufacture of safe fertilizer products made with phosphate and potash rock and some organic matter. Already there are a few companies manufacturing such products, and perhaps even more money could be made with them.

I want to suggest a congressional investigation of grants given by the fertilizer industry to research institutions and the effect of such grants on the welfare of the farmer and his soil and the public and the nutritional quality of the food it gets.

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Radiant Heat Generator

Evans Products Company

A radiant heat generator to protect the fields of growers of flowers, fruit and vegetables. The generator was developed by agricultural engineers at Michigan State College.

This frost dispeller does not rely upon heated air to carry warmth to the plants. Rather, its smokeless burner generates radiant heat in the form of infrared rays. These rays pass through the air without warming it, but when they strike plants

and soil, they penetrate and create heat from within. Good results have been reported. A truck farmer in El Centro, California didn't lose a leaf in an entire field of summer squash during a frost at 26 degrees F. A 24-page booklet on frost and the frost dispeller, termed the Frostguard, is available. Write Evans Products Company, Dept. OF, 509 Eckles Road, Plymouth, Michigan.

Poultry Land Cleanser

Organic Implements & Products

A method of preventing disease in poultry has recently made its debut in the United States after having been used successfully in England. The trade name for this imported preparation is Fertosan Poultry Land Cleanser.

One hundred per cent organic this material consists of a new Bacterial-Fungi preparation. You may order or obtain more information from The Organic Implements and Products Co., Haddon Heights, Dept. OF, N. J.

Snow Blower

Gravely Company

A new, heavy-duty Snow Blower that will handle snows up to four feet deep is now available for the five horsepower Gravely Tractor.

The Snow Blower attachment is quickly adjustable to throw snow either to the right or left, at any angle desired by the operator. A

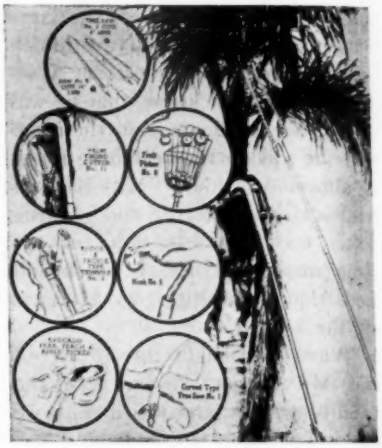
swath 25 inches wide can be cut through snows up to four feet deep.

The manufacturers, Gravely Motor Plow and Cultivator Co., Dunbar, West Virginia, are offering a free circular on solving snow removal problems with their equipment.

Combination Pole

J. B. Sebrell Corporation

A new sectional combination pole that can be used for picking fruit, shaking nuts, pruning, trimming and sawing has been developed by the J. B. Sebrell Corporation. The manufacturer takes a 30-foot pole and cuts it up into any number of sections desired. Division of poles into sections strengthens rather than weak-



ens them, since the poles are reenforced by two pieces of aluminum where they join. An insulated pole is obtainable for use when working near electric power lines. J. B. Sebrell Corp., 300 S. Los Angeles St., Los Angeles 13, California, is the manufacturer.

Side Delivery Rake

Harry Ferguson, Inc.

A new side delivery rake featuring a true lateral motion which reduces the movement of hay from swath to windrow by fifty percent, has been developed by Harry Ferguson, Inc. New design incorporated in the angle of spiders and rake bars has eliminated the conventional forward-sideward motion which requires moving hay a longer distance from swath to windrow. This eliminates considerable tossing and rolling and decreases damage to leafage. It makes a uniform, loose and fluffy windrow, which permits good air circulation for rapid drying. Harry Ferguson, Inc., 3639 E. Milwaukee Ave., Detroit 11, Michigan.

Rancho Mulcho

(*Continued from page* 31)

dry black soil with its large cracks has been changed to a soft, golden brown. The soil is soft and can be picked up easily now with the tips of one's fingers, and it looks much like virgin mountain loam. It is comparable with the best soil I have ever seen. We have kept it watered well in order to encourage greater earthworm activity.

The acreage now looks much better than it did two years ago. Tree and plant diseases of the past are disappearing; the fruit is of the best size, taste, and quality we have ever harvested; vegetables are more delicious, larger, and grow more abundantly; and the avocado trees which appeared to be dying are now growing and appear to be in a healthy condition; the leaves are a beautiful, glistening green. The sapota trees, now more than twelve years old, are bearing fruit this summer for the first time. Apricots were larger and sweeter than ever, with dark, reddish colored meat that appeared to be high in Vitamin A.

The oranges, lemons, and sweet limes are also larger and of better quality than ever before. We are now picking the year's first crop of figs. They are truly delicious; and the tangelos have been a success this year for the first time, although the tree is now about seven years old. The cumquats and pomegranates are larger than previously, and the guavas are large, soft, and sweet. We now have strawberries for the first time, although, in past years we had planted them unsuccessfully several times. The roses and iris are more beautiful; and the lilies are about twice the size they have ever been in previous years. We grew many fine gladiolus this spring; and the ivy and geraniums around the house look like those of a really well-taken-care-of garden, despite fewer hours of work being spent on them this year than before.

The finished compost, which was sifted and distributed over the lawns, has completely rejuvenated them. They were, as previously stated, thin, full of weeds, and infested with moths, but now they are an even green with a minimum of weeds and of moths which are rapidly disappearing. The lawns hold their moisture better than before and are presenting an appearance several times as charming as before.

This year, for the first time in a decade, we have been successful in growing tomatoes and corn. Artichokes were also fairly successful, although we have had some trouble with aphids, which were carried on to these and other plants by ants. Neighbors have advised us to use arsenic. So far, we have refused to do so, but to date we have been unable to solve the ant problem.

Our lettuce, planted practically in a compost bed, has grown large and has been a delight to use in the daily salads. Beets and carrots are larger and of a deeper color than before; and we are having success for the first time in many years with raspberries, blackberries, and boysenberries.

Even the eucalyptus grove is looking healthier, since in the midst of it we had prepared most of our compost heaps; and drainage from the compost has served well to improve the growth of the other decorative shade trees and shrubs.

We also tried rock mulching in two different ways. First, we used larger rocks around the trunks of about fifty fruit trees extending out toward the drip line; and then we put about one-quarter ton of pea gravel around the drip line of each of the trees, which allows water to seep through it easily and still serves to hold down the compost, giving an ideal environment beneath it for breeding of the earthworms.

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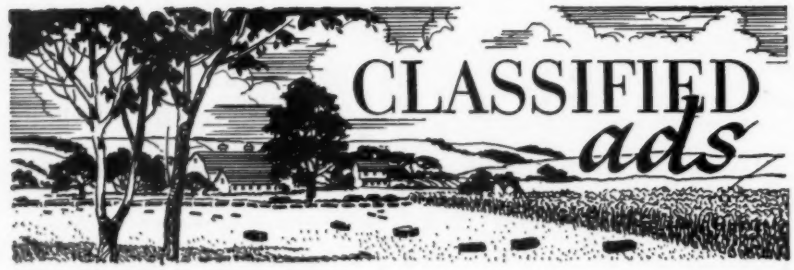

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Lake States Forest Planting

Approximately 9 million acres of cut-over and burned-over forest land need replanting in the Lake States if the area is to be restored to valuable forest growth in the near future, according to Technical Bulletin No. 1010, *Forest Plantations in the Lake States.* An additional 3½ million acres of understocked young stands could be made much more productive by partial planting, says the U. S. Department of Agriculture.

The author estimates that this planting project would cost 180 million dollars at prewar prices. Present costs are substantially higher. The program, if carried out over a 20-year period, would involve planting 600,000 acres a year, four times the peak rate of Civilian Conservation Corps planting in the Lake States. It would require a 250 per cent increase in nursery capacity and would provide 1¼ million man-months of work.

The 171-page bulletin was prepared by Paul O. Rudolf of the Lake States Forest Experiment Station of the Forest Service as a general guide for the reforestation program of the area. It presents in summary form the results of research and experience over many years, containing information on the physical characteristics of the region, problems in maintaining forest plantations, and methods by which many important problems and obstacles to successful reforestation can be overcome.

The author says that points which must be considered in a long-range view of the job ahead are: (1) Where and what species to plant; (2) how to plant – hand vs. machine methods, care of nursery stock, and ground preparation; (3) when to plant; (4) advance estimates on cost of planting; and (5) use of suitable species to reduce soil erosion.

In discussing direct seeding the author points out that experiments indicate that it should not be used as a substitute for direct planting but as a supplement and then only under very favorable conditions.

To date some 1,400,000 acres have been planted in the Lake States. Planned reforestation work began in that region on a small scale in 1910. Mr. Rudolf says. The program took a spurt under the Civilian Conservation Corps, reaching a peak of 144,000 acres in 1936. Although several thousand acres have been planted since – largely to red, white and jack pine – the area presents one of the largest reforestation problems in the country.

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Trees and Agriculture

(*Continued from page* 19)

farther westward the hardwoods thin out, giving way to the treeless prairie and plains region. At first the prairies are covered with tall grass, but farther west the climate becomes drier, resulting in short grass replacing the tall. The plains extend to the Rockies, followed by the Cascades and the Sierras with fir growths, particularly on the Pacific slopes.

In the Arctic of the U. S. S. R. is a zone of perpetual frozen swamp, the tundra. To the south is a wide belt of spruce and pine known as the taiga, corresponding to vegetation on our eastern shores. Then follows a belt of oak, maple and beech – hardwoods. Farther south the hardwoods diminish, finally giving way to a flat grass country, the steppes – our prairies. The steppes become more arid to the south, as our western plains, and extend to the foothills of the Caucasian Mountains, the slopes of which are covered with fir similar to our Douglas fir. The steppe country Russia is shelterbelting on a record scale. Needless to say the outcome will be watched with interest by all soil conservationists.

Of the farmer who sees but little connection between trees and successful agriculture, Dr. Zon must have been thinking when he recently wrote: "No region can sustain for long a stable agriculture if the forests are allowed to deterioate and become waste land. Neglect the forest and a Pandora's box of disastrous effects is opened. Snow and rainfall permeate the protection of dense forest cover and enrich the subsoil with moisture; without forest protection the moisture runs off as flood waters damaging agriculture, impeding navigation, causing property damage and endangering human life. Poor sandy soils when overgrazed or improperly cultivated become blowing sands encroaching upon good agricultural land. As a result of excessive erosion by wind and water, deep gullies scar the land; the ground waters sink lower. Deprived of the moderating influence of the forest, the land is exposed to the extreme fluctuations of the weather. Droughts occur more frequently. The whole environment becomes less hospitable to human life. There are, unfortunately, only too many such degraded regions throughout the world bearing tragic testimony to the folly of man."

These words are both a warning and a prophecy; they should start farmers thinking about present and future treelands. The Government recently issued an attractively-bound book entitled *Trees – The Yearbook of Agriculture*, 1949. The volume is crammed with information on shelterbelts, soil conservation, farm woodlots and lumbering – all about the 1,182 kinds of trees in the United States. The first line by Charles F. Brannan, Secretary of Agriculture, reads: "I wish, for several reasons, that every American might have the opportunity to read this book about trees." That opportunity is yours for the asking. Drop a postcard to your congressman, and if the supply isn't exhausted the mailman will bring you the volume. It's filled with sufficient, interesting data to keep you busy reading every evening all next winter. You may be surprised to learn how a few trees around the farm will enhance not only your property, but also your crop value.

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